Improve Production in Small and Medium Enterprises

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Abstract. Knowledge management has gained relevance during the last years to improve business functioning. However, there is still a growing need of developing innovative tools that can help small to medium sized enterprises to detect and predict undesired situations. This article present a multi-agent system aimed at detecting risky situations. The multi-agent system incorporates models for reasoning and makes predictions using case-based reasoning. The models are used to detect risky situations and an providing decision support facilities. An initial prototype was developed and the results obtained related to small and medium enterprises in a real scenario are presented.

Keywords: Hybrid neural intelligent system, CBR, MAS, Business Intelligence, business risk prediction.

1 Introduction

Knowledge Management is a fundamental asset for businesses in the contemporary economy. Knowledge takes into account the organization of the

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business, individuals and the information [12]. Knowledge management can be applied to different organizations and different contexts. In the present financial context, it is increasilly relevant to provide innovative tools and decision support systems that can help the small-medium enterprises (SMEs) to improve their functioning [8], [11]. These tools and methods can contribute to improve the existing business control mechanisms, reducing the risk by predicting undesiderable situations and providing recommendations based on previous experiences [2].

This article presents an innovative approach, based on multi-agent systems [10], to propose a model for risk management and prediction in SMEs. Multi-agent systems are the most prevalent solution to construct Artificial Intelligence distributed systems. Intelligent agents can incorporate advanced artificial intelligence models to predict risky situations. In this study we propose a distributed approach where the components of a SME are modeled as intelligent agents that collaborate to create models that can evolve over the time and adapt to the changing conditions of the environment. Thus, making possible to detect risky situations for the SMEs and providing suggestions and recommendations that can help to avoid possible undesiderable situations. The core of the multi-agent system are the evaluator and advisor agents, that incorporate new techniques to analyze the data from enterprises, extract the relevant information, and detect possible failures or inefficiencies in the operation processes.

The article is structured as follows: the next section briefly introduces the problem that motivates this research. Section 3 presents the multi-agent system for managing small and medium enterprises and Section 4 describes its implementation. Section 5 presents the results obtained after testing the system.

2 Enterprise Risk Management

“Risk Management” is a broad term for the business discipline that protects the assets and profits of an organization by reducing the potential for risks before it occurs, mitigating the impact of a loss if it occurs, and executing a swift recovery after a loss occurs. It involves a series of steps that include risk identification, the measurement and evaluation of exposures, exposure reduction or elimination, risk reporting, and risk transfer and/or financing for losses that may occur. All organizations practice risk management in multiple forms, depending on the exposure being addressed [1].

The economic environment has increased the pressure on all companies to address risks at the highest levels of the organization. Companies that incorporate a strategic approach to risk management use specialized tools and have more structured and frequent reporting on risk management. As such, they are in a better position to ensure that risk management provides relevant and applicable information that meets the needs of the organization and executive team. But no matter what an organization’s approach is, the tools used must be backed up by solid, actionable reporting addressed [1]. It’s not always necessary for the risk managers to be conducting their own studies for their voices to be heard. Forging a strong relationship with internal auditors and other departments can allow risk