EVALUATING KNOWLEDGE MANAGEMENT MATURITY WITH FUZZY LOGIC: EXPLORING AI-AUGMENTED MODELS FOR ORGANIZATIONAL INSIGHT

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1 INTRODUCTION

In recent decades, knowledge management (KM) has become a cornerstone of organizational competitiveness and adaptability. In environments shaped by rapid change, increasing complexity, and constant information overload, organizations need systems that not only store knowledge but also evaluate its relevance and impact.

Knowledge Management Maturity Models (KMMMs) are designed to help identify where an organization stands in terms of knowledge integration. However, traditional models often lack the flexibility to capture subjective input and contextual nuances.

This paper introduces a fuzzy logic-based approach to interpreting structured inputs in a more flexible and human-aligned way. The model supports layered reasoning across key KM components, offering more nuanced insights than traditional methods. In addition, it explores how artificial intelligence could enhance interpretation and feedback through a hybrid, augmented framework that remains accessible and scalable.

2 MATERIAL AND METHODS

To support the evaluation process, a structured questionnaire was developed to capture key components of organizational knowledge management. The purpose is to uncover how the combination and coordination of these elements contribute to strategic objectives, even in volatile business environments. Respondents rate each item on a Likert scale from 1 to 10, jointly interpreted with interviewers to ensure consistency. These numerical values serve as input for the fuzzy evaluation model, which processes them using a two-level rule system.

The fuzzification process transforms these values into linguistic categories – "weak," "adequate," and "excellent" – based on predefined interpretation ranges. A two-level fuzzy rule system was designed to process these variables using triangular and trapezoidal membership functions. At the first level, the model evaluates individual system components, including training strategy, system efficiency, qualification matrices, motivational mechanisms, reward systems, idea management, career planning, and mentoring programs. At the second level, these elements are grouped into broader categories, and their aggregated output is defuzzified using a weighted average method to produce a single numerical maturity score that characterizes the KM system of the given organization.

The model structure was developed to be adaptable across different industries and organizational cultures, with a rule matrix capable of standardizing evaluation while allowing for

contextual flexibility. To validate reliability, performance indicators such as the Feasibility Index (FI) and Accuracy Index (AI) are used.

While the current model is rule-based, future extensions may include artificial intelligence to enhance interpretation and automation. This could involve natural language feedback generation, integration with enterprise data structures, or the simulation of maturity scores without requiring full manual input—contributing to the development of a hybrid, AI-augmented KM evaluation framework.

3 RESULTS

The fuzzy evaluation model provides a structured way to interpret subjective input and complexity in KM systems. It distinguishes between organizations with similar scores by uncovering underlying differences in qualitative input.

For instance, two companies might receive the same overall maturity score, but differ significantly in areas like motivation or mentoring. The fuzzy model helps uncover these differences and supports decision-makers in identifying which aspects need improvement. Instead of a static result, the output becomes a profile that reflects the internal dynamics of how knowledge is supported across the organization.

As a future direction, artificial intelligence could support deeper understanding by identifying patterns or trends not immediately visible in the data.

4 CONCLUSIONS

The fuzzy logic-based model offers a nuanced way to evaluate knowledge management maturity in complex environments. It helps organizations turn subjective insights into structured feedback, making it easier to identify where improvement is needed.

This approach goes beyond static maturity models and better reflects how knowledge flows and evolves. Future integration of artificial intelligence could lead to an adaptive, self-improving evaluation system—one that not only measures knowledge but learns from it.

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