



Designing a Model for Selecting Financing Sources of Iranian Industrial Enterprises with Fuzzy ISM-MICMAC Approach¹

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INTRODUCTION

Financial security is paramount for industrial enterprises as it profoundly influences innovation expenditures, investments, enhances firm competitiveness, and augments market share by enabling full capacity utilization. However, the financing mechanisms vary depending on the enterprise's operational environment and are often subject to constraints. In Iran, due to fundamental weaknesses in domestic and

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international financing of industrial companies, a significant portion of these companies remains underfunded, leading to bankruptcies in some cases. Financial managers encounter various challenges in selecting the most appropriate financing method for their enterprises. This research aims to assist financial managers of industrial enterprises by presenting key micro and macro financial indicators in Iran to facilitate better decision-making regarding financing methods for their firms.

MATERIALS AND METHODS

This research utilizes a descriptive-survey method employing fuzzy interpretive structural modeling (ISM) – MICMAC approach to identify key financial indicators for industrial enterprises in Iran. Experts include financial experts and managers from small, medium, and large industrial enterprises in Guilan province, selected based on theoretical expertise, practical experience, willingness, and ability to participate in the research. A purposive sampling method identified twenty-three experts whose judgments were solicited through interviews and questionnaires. The validity of the questionnaire and measurement tools was assessed using validity criteria, employing content analysis for questionnaire validation.

Initially, 14 key financial indicators were identified through a review of relevant domestic research on enterprise financing and expert approval. Subsequently, experts completed a questionnaire to establish relationships between these indicators using triangular fuzzy numbers. Definite average values of expert judgments were obtained. A graphical model illustrating these relationships was developed, and MICMAC analysis determined the types of variables involved.

RESULTS AND DISCUSSION

According to the fuzzy ISM method, the indicators are categorized into different levels of influence on each other:

- First level: Restrictions on the use of financial instruments and legal restrictions.
- Second level: Mechanism of profit sharing of financial instruments.



- Third level: Risk associated with the source and volume of investment (financing), and financing time horizon.
- Fourth level: Cost of the financing process, expected return of the source, monetary policies of the central bank, and supervisory policies of the stock exchange organization.
- Fifth level: Credit status of the company.
- Sixth level: Optimal capital structure (cost of capital optimization) and risks related to financial instruments.
- Seventh level: Government financial policies.

MICMAC analysis revealed the following clusters:

- Dependent area (weak driving, high dependence): Restrictions on the use of funds of financial instruments, mechanism of profit sharing of financial instruments, and legal restrictions.
- Independent area (high driving, low dependence): Optimal capital structure, company's credit status, and government financial policies.
- Linkage area (high driving, high dependence): Source risk, investment volume, financing time horizon, expected return of the source, etc.

CONCLUSION

The research findings highlight that government financial policies exert the greatest influence on other financing indicators for industrial enterprises in Iran and play a central role in the internal connectivity analysis of these indicators. Therefore, government financial policies are crucial indicators for making key decisions in financing sourcing by industrial enterprises, prioritizing attention before other indicators in managerial decisions. Further analysis reveals that indicators such as restrictions on the use of financial instruments and legal restrictions form the foundational level in the fuzzy ISM model, indicating their fundamental impact across all other indicators. In contrast, indicators in the independent cluster, namely optimal capital structure, firm's credit status, and government financial policies, exert significant influence on other indicators while receiving minimal impact from them. Therefore, these indicators hold critical importance when selecting financing sources.

Additionally, indicators in the linkage cluster demonstrate substantial influence on other indicators and are highly influenced by them.

Given the limitation of the ISM method in weighting indicators, future research could integrate techniques like fuzzy analytical network process to prioritize these indicators. Exploring relationships within the fuzzy ISM model offers a deeper understanding of these indicators and their interrelationships.

Keywords: Financing, Industrial Enterprise, Fuzzy Interpretive Structural Modeling, MICMAC Analysis.

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