DECIPHERING FINANCIAL HEALTH AND RISK: HIERARCHICAL RELATIONSHIPS AND INTERDEPENDENCIES AMONG KEY FACTORS

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Abstract

This study investigates the hierarchical relationships and interdependencies among various financial factors influencing companies' health. By employing Total Interpretive Structural Modeling (TISM) and Matrice d'Impacts Croisés Multiplication Appliquée à un Classement (MICMAC) analyses, the research identifies vital financial factors and their mutual influences. The study's primary findings reveal credit risk as a pivotal, independent factor with a substantial impact on other financial parameters. Furthermore, solvency, capital adequacy, and Tier 1 capital ratios emerge as fundamental determinants of a company's financial health. The MICMAC analysis classifies financial factors into four categories: independent, linkage, autonomous, and dependent. This research offers valuable insights for managers, policymakers, and investors in understanding the financial health of companies, enabling them to make well-informed decisions focusing on critical factors such as credit risk, solvency, and liquidity. The purpose of this paper is to investigate the hierarchical relationships and interdependencies among critical financial factors that influence a company's financial health, providing valuable insights for managers, policymakers, and investors to make well-informed decisions. This research contributes to the existing literature by employing a novel approach and evaluates a framework of risk factors generated by the TISM modelling to uncover the hierarchical relationships and interdependencies among financial factors, shedding light on critical aspects such as credit risk, solvency, and liquidity for decision-makers to consider in understanding and evaluating companies' financial health.

Keywords: *Financial Health, Credit Risk, TISM (Total Interpretive Structural Modeling). MICMAC Analysis, Interdependent Financial Factors*

1. INTRODUCTION

A company's financial health is crucial for its overall performance, long-term viability, and sustainability (Altman, 2000). A myriad of factors, such as credit risk management (Berger & DeYoung, 1997; Ranjita & Nishant, 2020), solvency (Vodová, 2011), liquidity (Mishra & Aspal, 2011), and profitability (Olson & Zoubi, 2008), significantly influence a company's financial well-being and might even lead to bankruptcy which makes it very important to model the financial failure and equity failure of the companies and markets as done in previous researches (Jitender,2021). Despite the extensive literature on these individual factors, the complex hierarchy and interdependence among various financial factors impacting companies have not been adequately explored.

The gap in the literature regarding the hierarchical relationships and interdependencies between the financial factors that affect companies' financial health (Kosmidou, 2008). A comprehensive understanding of these relationships and their implications is indispensable for managers, policymakers, and investors, who must make well-informed decisions to ensure organizational stability and growth.

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The primary objective of this study is to examine the hierarchical relationships and interdependencies between financial factors affecting companies' financial health. To achieve this goal, the study employs the Total Interpretive Structural Modeling (TISM) and Matrice d'Impacts Croisés Multiplication Appliquée à un Classement (MICMAC) analyses, which enable the identification of key financial factors and the understanding of their mutual influences.
The research questions addressed in this study are as follows:

1. What critical financial factors significantly influence a company's financial health?
2. How do these financial factors interrelate and form a hierarchy that affects a company's financial well-being?
3. How can classifying financial factors into independent, linkage, autonomous, and dependent categories inform the understanding of a company's financial health?

By addressing these research questions, this study aims to contribute to the existing literature on financial health by providing a comprehensive understanding of the hierarchical relationships and interdependencies between financial factors. The findings of this study have practical implications for managers, policymakers, and investors, who can make informed decisions by focusing on vital factors such as credit risk, solvency, and liquidity. Additionally, the study's results can be used as a basis for the development of effective financial management strategies and policies.

2. LITERATURE STUDY

A company's financial health is a complex and multifaceted construct that requires a thorough understanding of the various financial factors and their interrelationships. Several theories and frameworks have been proposed to provide insights into these factors and their relationships. This study draws upon four relevant theories and frameworks to understand companies' financial health better.
Firstly, financial ratio analysis, a fundamental tool for evaluating a company's performance and financial position, identify the key factors affecting companies' financial health. This approach enables the comparison of different companies within the same industry and facilitates the identification of strengths and weaknesses in a firm's financial performance (Rhyne & Brigham, 1979).

Secondly, credit risk management theory emphasizes managing risk exposure to ensure financial stability (Berger & DeYoung, 1997). The study incorporates this theory as an independent and pivotal factor, highlighting its importance in financial management. Effective credit risk management can reduce potential losses due to defaults and improve the company's overall financial health.Thirdly, the resource-based view (RBV) theory underscores tangible and intangible resources' role in determining a firm's competitive advantage and performance (Barney, 1991). In the context of this study, the effective management of resources, including assets and capital, plays a crucial role in a company's financial health. Companies that can efficiently allocate and utilize resources are more likely to achieve better financial outcomes.
Lastly, agency theory emphasizes the importance of financial performance measures, such as return on assets and equity, as indicators of managerial performance and aligning the interests of managers and shareholders (Jensen & Meckling, 1976). By using these performance measures, companies can assess the effectiveness of their management and ensure that managers are working toward the company's and its shareholders' best interests.

By drawing upon these theories and frameworks, this study provides a comprehensive understanding of the financial factors and their relationships, enabling effective financial

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management practices and contributing to the stability and success of companies and draws upon the conceptual framework depicted in Figure 1.

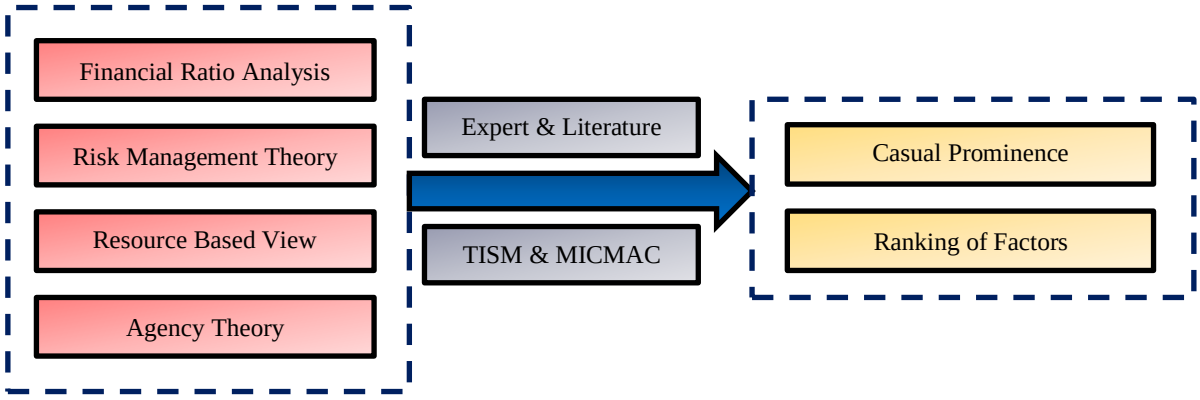

Figure 1 Conceptual Framework

2.1. Literature Review

A considerable body of literature underscores the significance of credit risk management in promoting companies' financial stability. Berger and DeYoung (1997) maintain that credit risk, which arises from potential defaults on loans or other financial obligations, constitutes a critical factor that influences a company's financial health. Managing credit risk exposure to minimize potential losses and maintain stability is particularly pertinent to financial institutions (Altman et al. 2017) posit that effective credit risk management practices can contribute to an organization's overall risk management strategy, safeguarding its financial well-being. In this regard, the literature emphasizes the interconnectivity of long-term solvency and short-term liquidity in shaping a company's financial health. (Vodová, 2011) argues that an organization must strike an adequate balance between long-term obligations and short-term liquidity to ensure financial stability. Rajan and Zingales (1995) contend that companies must manage their capital structure, including solvency and liquidity ratios, to optimize their financial performance and minimize the risk of insolvency. Additionally, the Basel Committee on Banking Supervision (2012) highlights the significance of capital adequacy and solvency ratios for banks, emphasizing their role in promoting financial stability.

Several studies have explored the relationship between profitability measures and other financial parameters. Olson and Zoubi (2008) demonstrate that profitability measures, such as Return on Assets (ROA) and Return on Equity (ROE), are contingent upon a company's efficiency and liquidity position. Naceur and Omran (2011) corroborate these findings by showing that higher operating efficiency and optimal liquidity management can lead to improved profitability. Moreover, Kosmidou (2008) emphasizes the importance of linkage factors, which mutually influence one another and significantly impact a company's financial well-being. These factors include Operating Efficiency Ratio, Funding Structure, Capital Adequacy Ratio, Tier 1 Capital Ratio, Return on Equity, Return on Assets, and Solvency Ratio. By examining the interrelationships between these factors, researchers can better understand the dynamics of a company's financial health and provide valuable insights for financial management practices. Deloof (2003) investigates the role of autonomous factors, such as Asset Turnover Ratio, in determining a company's financial health. Autonomous factors independently influence financial health and are not substantially affected by other financial parameters. Conversely, Mishra and

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Aspal (2011) identify the Liquidity Ratio as a dependent factor, suggesting that it is an outcome of various other financial parameters and a key indicator of short-term financial stability. In summary, these studies underscore the significance of a comprehensive approach to financial management that considers multiple factors and their interrelationships in promoting financial stability and success.

The paper has employed an extensive literature review of various literature published in the context of credit risk in various databases using the PRISMA method (Figure 2). The study employs TISM and MICMAC analysis to formulate the relationships and driving and dependence power of each factor to form a Casual-Prominence of factors and ranking of factors (Vimal et al., 2022). One expert from Industry were also asked to help to validate the formation of this initial reachability matrix. The reachability matrix was accepted after the study only after expert review. Table 1 represents the factors identified and their definitions.

Table 1 Factors definitions

S.no	Factor	Definition
D1	Credit Risk Indicator (CRI)	A measure of the likelihood of a borrower defaulting on loan obligations, considering credit history and financial position.
D2	Funding Structure (FS)	A company's mix of debt and equity used to finance its operations and growth.
D3	Liquidity Ratio (LR)	A metric to assess a company's ability to meet short-term obligations by converting assets into cash.
D4	Solvency Ratio (SR)	A financial ratio evaluating a company's long-term stability by measuring its ability to meet long-term debt obligations.
D5	Asset Turnover Ratio (ATR)	A measure of a company's efficiency in using its assets to generate revenue.
D6	Operating Efficiency Ratio (OER)	A financial ratio comparing a company's operating expenses to its net income to evaluate operational efficiency.
D7	Return on Assets (ROA)	A measure of a company's profitability relative to its total assets, indicating asset-use effectiveness.
D8	Return on Equity (ROE)	A financial ratio measuring a company's profitability relative to shareholder's equity, indicating equity-use effectiveness.
D9	Capital Adequacy Ratio (CAR)	A financial metric evaluating a bank's ability to absorb losses and meet capital requirements.
D10	Tier 1 Capital Ratio (T1CR)	A financial ratio measuring a companies core capital relative to its total risk-weighted assets, indicating financial strength.

2.2 Establishing Relationships

2.2.1 Driver 1 - Credit Risk Indicator (CRI)

The interdependence between Credit Risk Indicator (CRI) and various financial factors, such as Funding Structure (FS), Liquidity Ratio (LR), Solvency Ratio (SR), Capital Adequacy Ratio (CAR), and Tier 1 Capital Ratio (T1CR), is crucial for financial stability and risk management in companies. Research highlights that an organization's FS affects its credit risk and credit rating (Kosmidou, 2008; Kanno, 2014), while credit risk influences funding structure (Hagelmayer, 1994; Harasztosi & Kátay, 2020). The relationship between CRI and LR is evident

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as firms with higher credit risk struggle to maintain liquidity due to funding constraints (Vodová, 2011), and adequate credit risk management helps maintain liquidity levels (Wang & Zhang, 2023).

Higher credit risk is associated with lower solvency ratios due to increased financial leverage (Berger & DeYoung, 1997), while solid solvency positions signal lower default likelihood (Olson & Zoubi, 2008). The relationship between CRI and CAR is significant, as banks with higher capital adequacy ratios exhibit lower credit risk (Kosmidou, 2008), and maintaining adequate capital levels enhances financial stability (Altman, 2000). Similarly, the link between CRI and T1CR is established, with banks having higher Tier 1 capital ratios showing lower credit risk (Kosmidou, 2008) and a strong Tier 1 capital position ensuring long-term stability (Altman, 2000).

2.2.2 Driver 2- Funding Structure (FS)

The financial literature extensively investigates the interdependence among funding structure, credit risk indicators, and liquidity ratio. The funding structure, comprising a company's debt and equity, is crucial for determining financial stability and risk exposure (Brusov et al., 2022). A diversified funding structure minimizes financial risk and enhances a company's resilience during economic uncertainties (Frank & Goyal, 2008). The credit risk indicator reflects the default probability and loss exposure in a company's lending activities (Berger & DeYoung, 1997). Higher values indicate a greater likelihood of default and negative impacts on profitability and stability (Jarrow & Turnbull, 2000). A company's funding structure and credit risk indicator are interdependent, as increased leverage raises the default probability and credit risk indicator (Giesecke & Kim, 2011). The liquidity ratio, measuring a company's capacity to fulfil short-term financial obligations, indicates better financial health (Chaudhury, 2020; Vodová, 2014). A robust liquidity position reduces credit risk by providing a buffer against unforeseen financial shocks (Diamond & Rajan, 2001).

2.2.3 Driver 3 - Liquidity Ratio (LR)

The financial literature has thoroughly investigated the interdependence among funding structure, credit risk indicators, and liquidity ratio. The company's debt and equity funding structure is crucial for determining financial stability and risk exposure (Brusov et al., 2022). A diversified funding structure reduces financial risk and enhances a company's resilience during economic uncertainties (Frank & Goyal, 2008).

Credit risk indicator reflects the default probability and loss exposure in a company's lending activities (Berger & DeYoung, 1997). Higher values indicate increased default likelihood and negative impacts on profitability and stability (Jarrow & Turnbull, 2000). It is suggested that funding structure and credit risk indicators are interdependent, as higher leverage raises the default probability and credit risk indicator (Giesecke & Kim, 2011).

The liquidity ratio measures a company's capacity to fulfil short-term financial obligations (Chaudhury, 2020), with higher ratios indicating better financial health (Vodová, 2011). A strong liquidity position reduces credit risk by providing a buffer against unexpected financial shocks (Diamond & Rajan, 2001).

Studies have examined the interdependence between funding structure, credit risk indicator, and liquidity ratio. Diamond and Rajan (2001) argue that firms with higher leverage and credit risk require higher liquidity ratios for financial stability. Fama and French (2002) find that firms with higher credit risk indicators tend to have lower liquidity ratios, indicating challenges in meeting short-term financial obligations. Additionally, Gertler and Kiyotaki (2010) suggest that

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firms heavily relying on short-term debt may face higher credit risk due to rollover risk and possible liquidity crises, incentivizing them to maintain higher liquidity ratios to mitigate credit risk ensure financial stability.

2.2.4 Driver 4 - Solvency Ratio (SR)

The financial literature has extensively examined the interdependence between liquidity ratio, funding structure, and solvency ratio, critical factors determining a company's financial health and stability. The liquidity ratio, reflecting a company's ability to meet short-term obligations, is linked to funding structure, as it represents the composition of capital sources (Chaudhury, 2020b). Firms with higher proportions of short-term debt may face liquidity challenges (Diamond & Rajan, 2001), while those reliant on debt financing can encounter refinancing risks impacting liquidity (Gatev & Strahan, 2006).

The solvency ratio measures a company's ability to meet long-term obligations. Its relationship with liquidity ratio is significant, as higher solvency ratios often correlate with better short-term liquidity management (Vodová, 2011; Acharya et al., 2007). The solvency ratio is also associated with funding structure, as firms balancing debt financing benefits and costs can affect solvency (Modigliani & Miller, 1958). Companies with higher long-term debt proportions will likely have higher solvency ratios (Frank & Goyal, 2008).

The interdependence between the solvency ratio and other financial ratios, such as liquidity ratio, ROA, ROE, CAR, and Tier 1 capital ratio, is crucial for understanding financial stability, performance, and resilience. Firms with higher solvency ratios tend to maintain higher liquidity ratios (Vodová, 2011), better profitability performance (Olson & Zoubi, 2008), and improved reputations (Jensen & Meckling, 1976). Additionally, the literature reports strong relationships between solvency ratio and CAR (Kosmidou, 2008) and between solvency and Tier 1 capital ratios (Demirgüç-Kunt et al., 2013), indicating that companies with more substantial capital positions maintain higher solvency ratios.

2.2.5 Driver 5 - Asset Turnover Ratio (ATR)

The financial literature has investigated the interdependence between asset turnover ratio, operating efficiency ratio, and return on assets (ROA). The asset turnover ratio measures a company's ability to generate sales revenue from its assets and is a crucial determinant of firm performance (Deloof, 2003). The operating efficiency ratio, reflecting resource utilization efficiency in generating revenue, is closely related to the asset turnover ratio (Kallberg & Liu, 2000). Studies show that firms with higher operating efficiency ratios have higher asset turnover ratios, indicating effective asset use for sales generation (Liu & Hung, 2006; Kosmidou, 2008).
ROA, a widely used profitability metric, measures a company's efficiency in generating profits from its assets (Olson & Zoubi, 2008). Higher asset turnover ratios suggest better asset utilization, increasing profitability as measured by ROA (Chen & Shimerda, 1981). A positive association between asset turnover ratio and ROA has been observed, indicating that firms with efficient asset management tend to exhibit higher profitability (Zhang, 2017).

2.2.6 Driver 6 - Operating Efficiency Ratio (OER)

The interdependence between Operating Efficiency Ratio (OER) and financial ratios such as Asset Turnover Ratio (ATR), Return on Assets (ROA), and Return on Equity (ROE) has been extensively studied in corporate finance to understand better factors influencing a company's financial performance and their relationships. A well-established link between OER and ATR

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exists, with higher OER associated with higher ATR, suggesting that efficient operations contribute to effective asset utilization (Deloof, 2003; Lazaridis & Tryfonidis, 2006).

Similarly, numerous studies have demonstrated the connection between OER and ROA, highlighting the importance of efficient operations in enhancing overall profitability (Olson & Zoubi, 2008; Sufian & Habibullah, 2009). Lastly, the literature has documented the relationship between OER and ROE, indicating that higher operational efficiency leads to improved company performance and higher equity returns (Kosmidou, 2008; Athanasoglou et al., 2006).

2.2.7 Driver 7 - Return on Assets (ROA)

The financial literature has extensively discussed the interdependence between return on assets (ROA) and various financial ratios, such as funding structure, solvency ratio, operating efficiency ratio, return on equity (ROE), capital adequacy ratio, and Tier 1 capital ratio. ROA measures the efficiency with which a company generates profits from its assets (Olson & Zoubi, 2008).

Studies suggest that firms with an optimal balance of debt and equity tend to exhibit higher ROA levels (Rajan & Zingales, 1995; Titman & Wessels, 1988). Companies with higher solvency ratios generally have better financial health and higher ROA (Vodová, 2011; Kosmidou, 2008). A positive relationship exists between the operating efficiency ratio and ROA, indicating better asset utilization and profitability (Kallberg & Liu, 2000; Liu & Hung, 2006).

ROA and ROE have also established a positive relationship, two key profitability measures (Olson & Zoubi, 2008). Although the relationship between capital adequacy ratios, Tier 1 capital ratios, and ROA is less direct, banks with higher capital adequacy ratios tend to exhibit higher ROA levels, as they can better manage risks and maintain profitability (Kosmidou, 2008; Basel Committee on Banking Supervision, 2010).

2.2.8 Driver 8 - Return on Equity (ROE)

The literature widely explores the interdependence between Return on Equity (ROE) and other financial ratios, providing insights into a company's financial performance and stability. Optimal funding structures are crucial for maximizing ROE while minimizing financial risk (Goddard et al., 2004; Frank & Goyal, 2009). Solvent firms with higher solvency ratios tend to have higher ROE due to more favourable borrowing terms (Vodová, 2019; Kosmidou, 2008).

Efficient asset utilization, as measured by the asset turnover ratio, can lead to higher profitability and ROE (Deloof, 2003). The operating efficiency ratio is also essential for enhancing a company's profitability, including ROE, with firms having lower operating expenses than their revenue-generating higher ROE (Sufian & Habibullah, 2009; Athanasoglou et al., 2008).

A strong correlation exists between Return on Assets (ROA) and ROE, as efficient use of assets contributes to both profitability ratios (Olson & Zoubi, 2008; Sufian & Habibullah, 2009). Well-capitalized banks with higher capital adequacy ratios (CAR) and Tier 1 capital ratios tend to have higher ROE, as adequate capital buffers help maintain investor confidence and absorb losses (Berger, 1995; Demirgüç-Kunt & Huizinga, 1999).

2.2.9 Driver 9 - Capital Adequacy Ratio (CAR)

The interdependence between financial ratios, such as Return on Equity (ROE) (Goddard et al., 2004), Solvency Ratio (Vodová, 2011), Return on Assets (ROA) (Olson & Zoubi, 2008), and Tier 1 Capital Ratio (Berger, 1995), is crucial for understanding a company's financial health and performance. A positive association exists between ROE and Solvency Ratio, as higher solvency indicates better capital management and financial strength, ultimately leading to higher

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shareholder returns (Athanasoglou et al., 2006). A consistently positive correlation has been observed between ROA and ROE in the literature, with higher asset efficiency typically resulting in increased overall profitability (Sufian & Habibullah, 2009).

Analyzing the dynamics of ROE, influenced by factors such as company size, industry, and macroeconomic conditions (Frank & Goyal, 2009), provides valuable insights into factors driving changes in a company's profitability. The relationship between the Tier 1 Capital Ratio and ROE has been confirmed in various studies, emphasizing the importance of maintaining an adequate capital buffer to ensure sustainable growth and profitability (Kosmidou, 2008).

2.2.10 Driver 10 - Tier 1 Capital Ratio (T1CR)

The Tier 1 Capital Ratio (T1CR) is a critical indicator of a bank's financial strength and stability, reflecting its ability to absorb losses and maintain operations during adverse economic conditions (Basel Committee on Banking Supervision, 2010). Studies have found positive relationships between T1CR and various financial performance measures, including solvency ratio (Berger, 1995; Goddard et al., 2004), return on assets (ROA) (Sufian & Habibullah, 2009; Athanasoglou et al., 2006), and capital adequacy ratio (CAR) (Sufian & Habibullah, 2009).

The interdependence between T1CR and return on equity (ROE) is more complex, with some researchers arguing that higher T1CR leads to lower ROE due to reduced leverage (Frank & Goyal, 2009), while others have found a positive association between the two variables, suggesting that well-capitalized banks are better positioned to maximize shareholder value (Goddard et al., 2004).

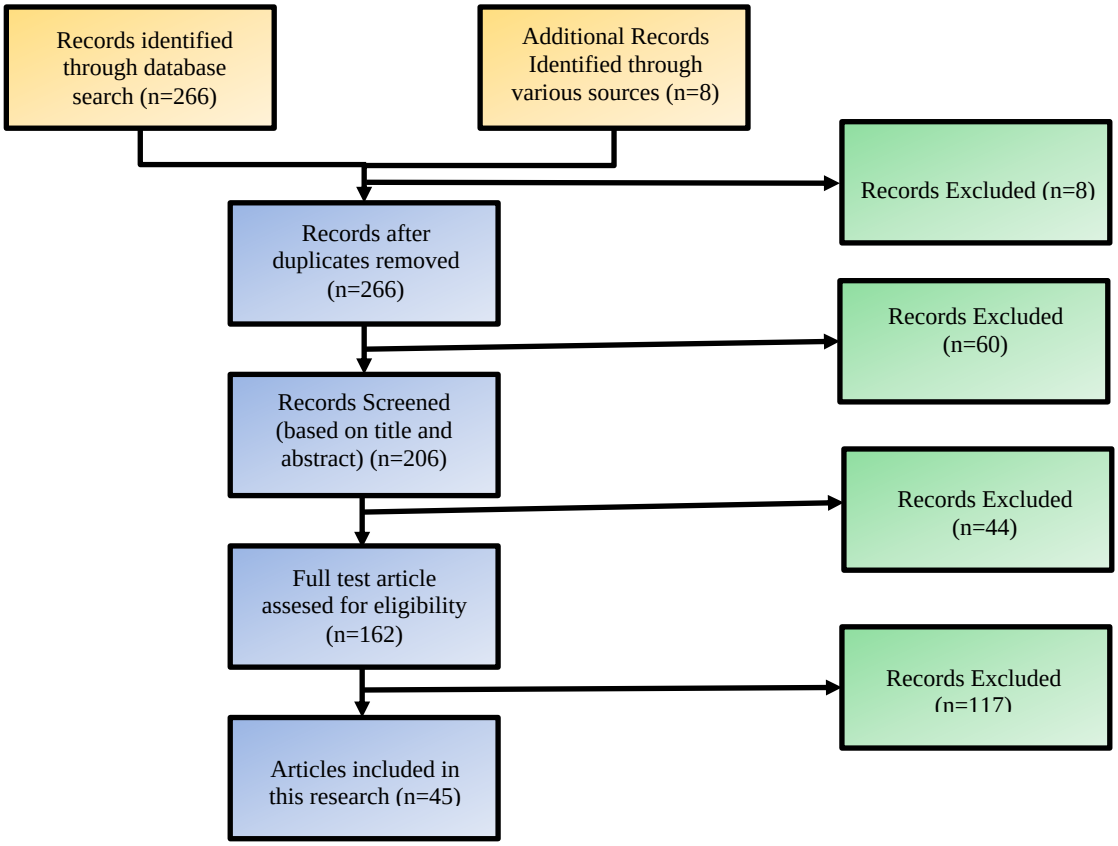

Figure 2 PRISMA Analysis

3. RESEARCH METHODOLOGY

The Total Interpretive Structural Modeling (TISM) and Matrice d'Impacts Croisés Multiplication Appliquée à un Classement (MICMAC) analyses are employed in this study, These are used to examine the hierarchical relationships and interdependencies between financial factors affecting companies' financial health.

3.1 Interpretive Structural Modeling (TISM)

Total Interpretive Structural Modeling (TISM) is a methodical approach to analyzing intricate relationships among factors within a system (Janes, 1988). TISM is an extension of the Interpretive Structural Modeling (ISM) technique that integrates expert opinions and interpretations to construct a hierarchical model of the factors under scrutiny. The TISM process involves the following steps:

Firstly, a comprehensive literature review was conducted to identify the critical financial factors influencing a company's financial health. This identification of financial factors was then validated through expert opinions from professionals in the field of finance, leading to the identification of ten factors. Secondly, expert was consulted to establish the contextual relationships between the identified financial factors. These relationships were expressed using binary relations, and the identified factors were validated as relevant to the study.

Thirdly, the relationships between the financial factors were represented in the Initial Reachability Matrix (IRM), with entries in the matrix representing the influence of one factor on another. This matrix represented relationships derived from the literature with the help of the expert and then validated by the expert. Table 2 represents the Initial Reachability Matrix.

Table 2 Initial Reachability Matrix

Driver	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
D1	1	1	1	1	0	0	0	0	1	1
D2	1	1	1	0	0	0	0	0	0	0
D3	0	1	1	1	0	0	0	0	0	0
D4	0	0	1	1	0	0	1	1	1	1
D5	0	0	0	0	1	1	1	0	0	0
D6	0	0	0	0	1	1	1	1	0	0
D7	0	1	0	1	0	1	1	1	1	1
D8	0	1	0	1	1	1	1	1	1	1
D9	0	0	0	1	0	0	1	1	1	1
D10	0	0	0	1	0	0	1	1	1	1

Fourthly, the Final Reachability Matrix was created and checked for transitive links. Transitive and significant transitive links were formed in this step, identifying three significant transitive relationships and 32 transitive links. Table 3 represents the final reachaility matrix. (*) signifies transitive link and (**) signifies a significant transitive link.

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Table 3 Final Reachability Matrix

Driver	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
D1	1	1	1	1	0	0	1**	1**	1	1
D2	1	1	1	1**	0	0	1*	1*	1*	1*
D3	0	1	1	1	0	0	1*	1*	1*	1*
D4	0	1*	1	1	1*	1*	1	1	1	1
D5	0	1*	0	1*	1	1	1	1*	1*	1*
D6	0	1*	0	1*	1	1	1	1	1*	1*
D7	1*	1	1*	1	1*	1	1	1	1	1
D8	1*	1	1*	1	1	1	1	1	1	1
D9	0	1*	1*	1	1*	1*	1	1	1	1
D10	0	1*	1*	1	1*	1*	1	1	1	1

The Binary Interaction Matrix was constructed using direct and significant transitive links. This matrix formed the basis for the level partitioning step of TISM and also the input matrix for MICMAC analysis. Table 4 represents the Binary Interaction matrix.

Table 4 Binary Interaction Matrix

Driver	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
D1	1	1	1	1	0	0	1	1	1	1
D2	1	1	1	1	0	0	0	0	0	0
D3	0	1	1	1	0	0	0	0	0	0
D4	0	0	1	1	0	0	1	1	1	1
D5	0	0	0	0	1	1	1	0	0	0
D6	0	0	0	0	1	1	1	1	0	0
D7	0	1	0	1	0	1	1	1	1	1
D8	0	1	0	1	1	1	1	1	1	1
D9	0	0	0	1	0	0	1	1	1	1
D10	0	0	0	1	0	0	1	1	1	1

Sixthly, the Binary Interaction Matrix was used for level partitioning, where the factors were assigned levels based on their dominance over other factors and their importance.Table 5 represents the Level Partitioining.Level partitioning was performed using Knime Data Analytics Software.

Table 5 Level Partitioning

	Driver	Reachability Set	Antecedent set	Intersection Set	Level Assigned
D1	Credit Risk Indicator (CRI)	1,2,3,4,7,8,9,10	1,2	1,2	V
D2	Funding Structure (FS)	1,2,3,4	1,2,3,7,8	1,2,3	I
D3	Liquidity Ratio (LR)	2,3,4	1,2,3,4	2,3,4	III
D4	Solvency Ratio (SR)	3,4,7,8,9,10	1,2,3,4,7,8,9,10	3,4,7,8,9,10	IV
D5	Asset Turnover Ratio (ATR)	5,6,7	5,6,8	5,6	I
D6	Operating Efficiency Ratio (OER)	5,6,7,8	5,6,7,8	5,6,7,8	III
D7	Return on Assets (ROA)	2,4,6,7,8,9,10	1,4,5,6,7,8,9,10	4,6,7,8,9,10	II
D8	Return on Equity (ROE)	2,4,5,6,7,8,9,10	1,4,6,7,8,9,10	4,6,7,8,9,10	II
D9	Capital Adequacy Ratio (CAR)	4,7,8,9,10	1,4,7,8,9,10	4,7,8,9,10	IV
D10	Tier 1 Capital Ratio (T1CR)	4,7,8,9,10	1,4,7,8,9,10	4,7,8,9,10	IV

Seventhly, the Initial Relationship Diagram was constructed using level partitioning, and the diagram was checked for any bottom-up links. Figure 3 represents the initial reachability diagraph.

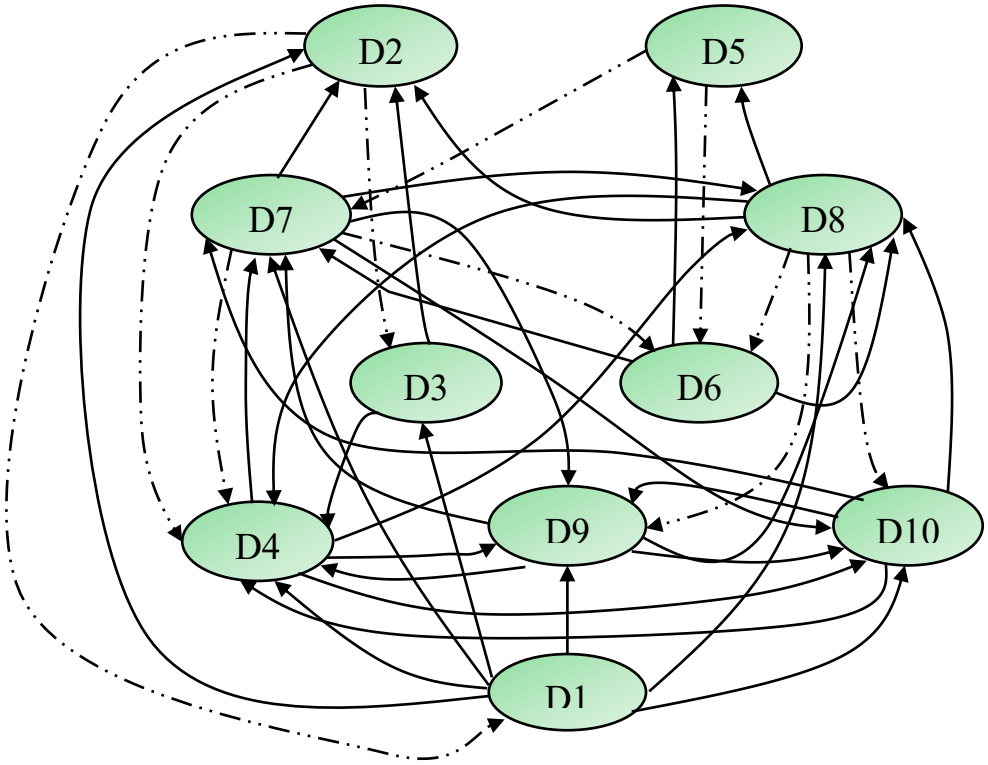

Figure 3 Initial Diagraph of Drivers

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Finally, the TISM Relationship Diagram was constructed by eliminating the 19 bottom-up links and mirror links found (eg – Links 4-7 and 7-4 are mirror links, only one of them is kept into the final TISM model), as the TISM methodology nullifies any bottom-up link if found. However, these links are considered for the MICMAC analysis. Figure 4 represents the TISM relationship diagraph.

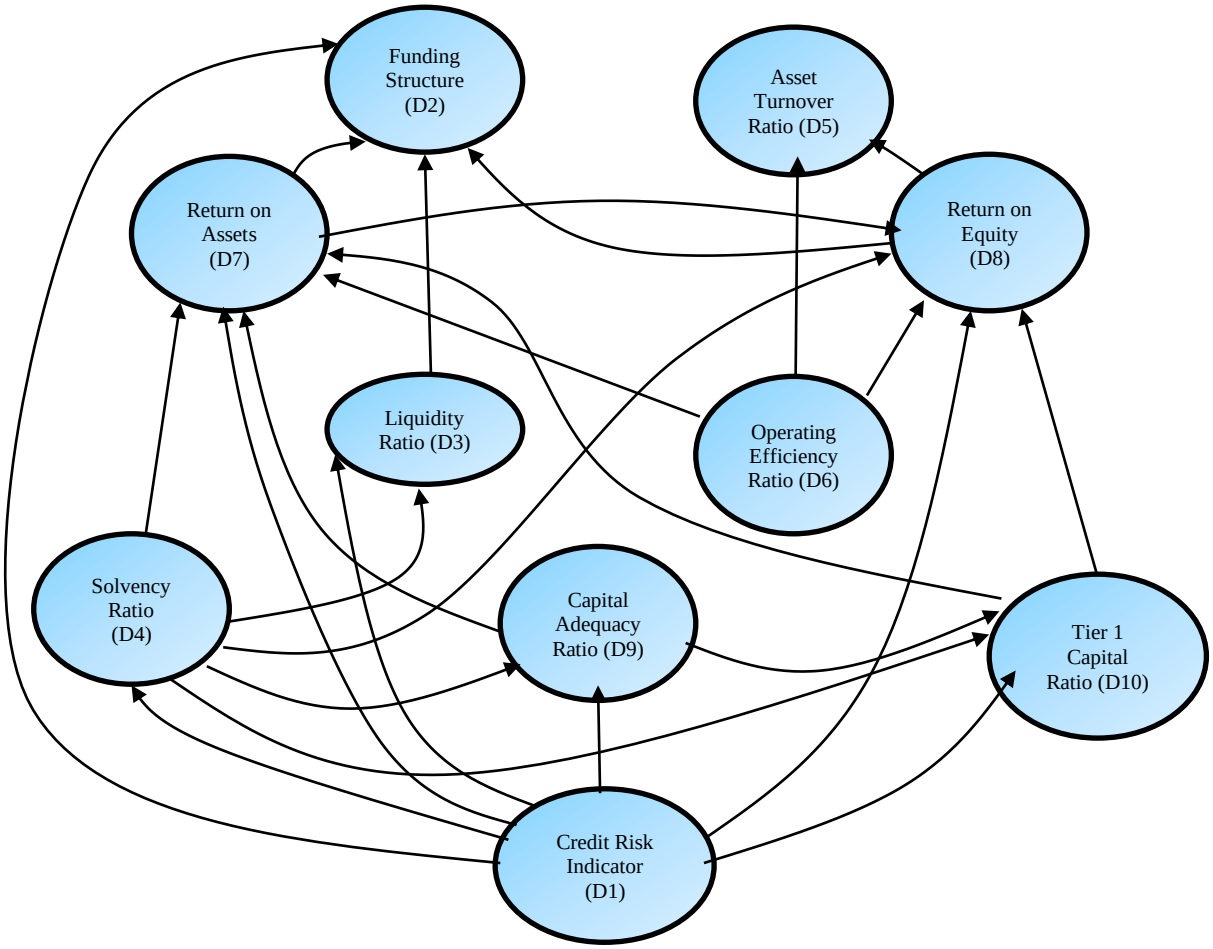

Figure 4 Validated Total Interpretive Structure Model

3.2 MICMAC Analysis

Table 6 Driving and Dependence Powers

	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10
DRIVING POWER	8	4	3	6	3	4	7	8	5	5
DEPENDENCE POWER	2	5	4	8	3	4	8	7	6	6

The MICMAC analysis is a cross-impact matrix technique that classifies factors into four categories: independent, linkage, autonomous, and dependent (Ahmad et al., 2019). The analysis

helps to identify the driving forces and dependencies among the factors under investigation. It divides the factors into 4 Categories as depicted in Figure 5. Using the driving and dependence powers obtained from the Binary Interaction Matrix as depicted in Table 6.

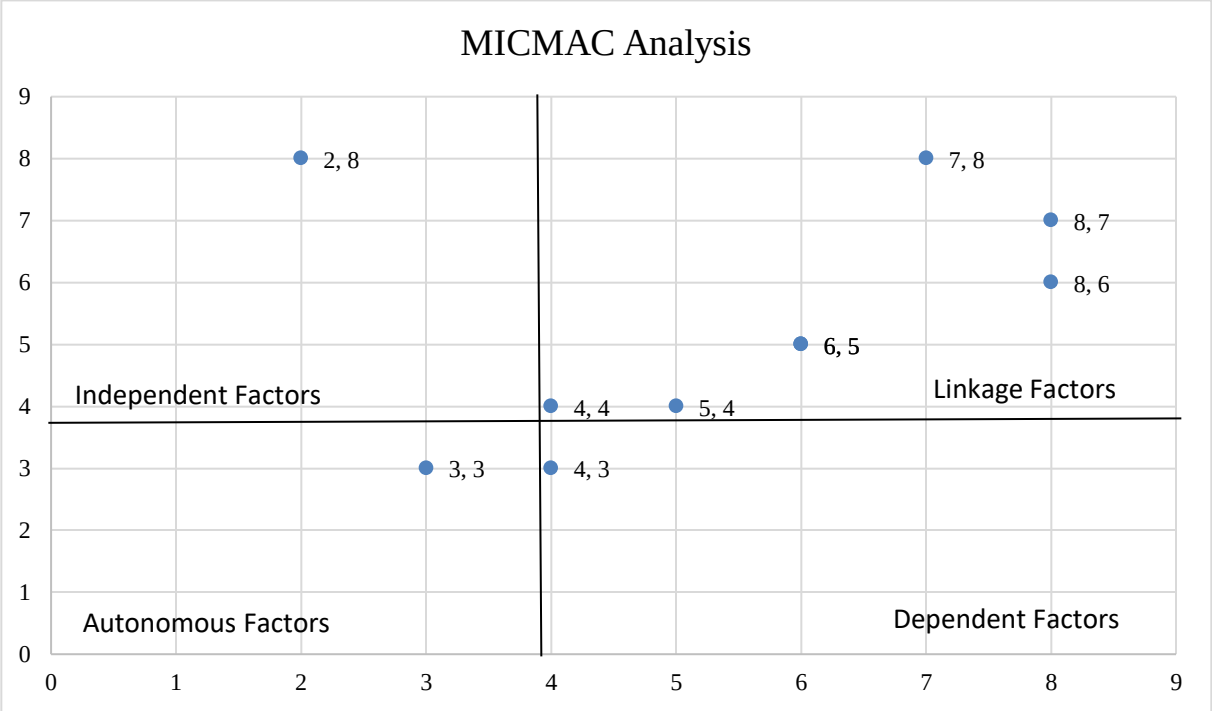

Figure 5 MICMAC Analysis

Autonomous factors in the bottom-left quadrant have low driving and dependence power, with minimal relation to other factors. Dependent factors in the bottom-right quadrant possess strong dependence but weak driving power. Linkage factors, occupying the top-right quadrant, are crucial for analysis due to their high driving and dependence power, influencing and being influenced by other factors. Independent factors in the top-left quadrant have low dependence power but high driving power.

The TISM and MICMAC analyses provide a comprehensive understanding of the hierarchical relationships and interdependencies between financial factors, enabling the investigation of the research questions posed in this study. The results of these analyses are presented in the next section.

4. RESULTS AND DISCUSSION

The outcomes of the TISM and MICMAC analyses unravel the sophisticated hierarchy and interdependence among diverse financial determinants influencing companies. The findings underscore that credit risk, embodied by the Credit Risk Indicator (D1), surfaces as a paramount, independent factor that considerably impacts other financial aspects while remaining relatively unswayed by them (Berger & DeYoung, 1997). This accentuates the necessity for organizations to assiduously manage their credit risk to guarantee stability and strong performance. At the financial hierarchy's bedrock, Solvency Ratio (D4), Capital Adequacy Ratio (D9), and Tier 1 Capital Ratio (D10) emerge as cardinal determinants of a company's financial health, signifying their capacity to fulfill long-term obligations (Basel Committee on Banking Supervision, 2010). These factors substantially shape Operating Efficiency Ratio (D6) and Liquidity Ratio (D3),

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demonstrating the interrelation between enduring financial stability and short-term liquidity management (Vodová, 2011).

Within the hierarchy, profitability measures, such as Return on Assets (D7) and Return on Equity (D8), hinge upon the efficacy and liquidity stance of the companies (Olson & Zoubi, 2008). Subsequently, Asset Turnover Ratio (D5) and Funding Structure (D2) are influenced by the company's profitability, emphasizing the role of asset utilization and proficient funding management in revenue generation (Chen & Shimerda, 1981).

The MICMAC analysis exposes the classification of financial determinants into four distinct categories: independent, linkage, autonomous, and dependent. Factors such as Operating Efficiency Ratio (D6), Funding Structure (D2), Capital Adequacy Ratio (D9), Tier 1 Capital Ratio (D10), Return on Equity (D8), Return on Assets (D7), and Solvency Ratio (D4) are pinpointed as linkage factors, underscoring their reciprocal influence and importance in molding a company's financial well-being (Kosmidou, 2008). Asset Turnover Ratio (D5) surfaces as an autonomous factor, suggesting its relatively independent bearing on the company's comprehensive financial health (Deloof, 2003). Lastly, the Liquidity Ratio (D3) emerges as a dependent factor, intimating that it is a crucial indicator of short-term financial stability and a consequence of numerous other financial parameters.

The TISM and MICMAC analyses have yielded valuable insights into financial management and offer theoretical implications for understanding the financial health of companies. The study reveals credit risk as a central factor, emphasizing the significance of credit risk management in organizational stability and performance. The hierarchical relationships among long-term and short-term financial stability parameters indicate their interdependence. The study also highlights the dependency of profitability measures on efficiency and liquidity positions, underscoring the need to consider the interrelationships with other financial factors. Identifying linkage factors in the MICMAC analysis highlights their mutual influence and significance. Additionally, categorizing Asset Turnover Ratio as an autonomous factor and Liquidity Ratio as a dependent factor provides insights into their roles in a company's financial health. Overall, these findings contribute to the existing body of knowledge on financial management and offer several theoretical implications for developing comprehensive financial management frameworks.

The TISM and MICMAC analyses have provided valuable insights into the financial factors affecting companies, with implications for both theoretical understanding and practical application. Specifically, managers can leverage these findings to improve their financial management practices by focusing on credit risk management, balancing long-term solvency and short-term liquidity, enhancing profitability through efficiency and liquidity management, leveraging linkage factors for financial well-being, and understanding the role of autonomous and dependent factors. Credit risk management is pivotal, and managers should prioritize regular assessment, robust credit policies, and risk mitigation techniques. Balancing long-term solvency and short-term liquidity requires adequate capital buffers and effective cash management practices. Enhancing profitability involves improving efficiency and maintaining optimal liquidity levels. Managers should also consider linkage factors and regularly review financial policies. Recognizing the distinct roles of autonomous and dependent factors, such as Asset Turnover Ratio and Liquidity Ratio, can inform better decision-making related to financial management practices.

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5. CONCLUSION

This study explored the intricate hierarchy and interdependence among various financial factors impacting companies by employing TISM and MICMAC analyses. The findings revealed the pivotal role of credit risk as an independent factor and emphasized the importance of long-term solvency and short-term liquidity management. Furthermore, the study uncovered the interrelationships between profitability measures, linkage factors, and other financial parameters, ultimately offering valuable insights into the financial health of companies.

These insights can assist managers, policymakers, and investors in making well-informed decisions and develop comprehensive financial management strategies. By understanding the hierarchical relationships and interdependencies between financial factors, stakeholders can focus on vital factors such as credit risk, solvency, and liquidity to ensure organizational stability and robust performance.

This study has identified certain limitations that suggest several avenues for further research. Firstly, researchers could expand the scope of financial factors under investigation by including additional parameters that may influence a company's financial health. This approach would provide a more comprehensive understanding of the financial dynamics. Finally, future research could investigate the impact of macroeconomic factors and market conditions on the relationships between financial factors, providing insights into how external conditions shape a company's financial health.

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