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Volume 1 *The Proceedings of the 23rd CIB World Building Congress* Article 4

2025

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CIB Conferences ISSN: 3067-4883

Recommended Citation

Jayan, Dennis; Domingo, Niluka Dr; Kahandawa, Ravindu; Wilkinson, Suzanne; Vishnu, Priya; and Gamage, Inoka Withana (2025) "Construction Company Insolvencies: State-of-the-Art Review," *CIB Conferences*: Vol. 1 Article 4.
DOI: https://doi.org/10.7771/3067-4883.1879

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Construction Company Insolvencies: State-of-the-Art Review

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Abstract
The surging tendency of insolvencies has emerged as a contemporary issue in the global construction industry. Moreover, these insolvencies have led to project failures, financial losses, and reputational damage within the construction industry. Despite the severity of the issue, there is a lack of research dedicated to introducing practical solutions to mitigate insolvencies. Accordingly, this research aims to pioneer a research direction to find practical and real-world methods to reduce insolvencies. To achieve this, the research combined a bibliometric analysis with a systematic literature review to map current research trends and systematically categorize insolvency factors into themes. Findings reveal that the current research is focused on developing financial ratios to predict insolvencies, undermining the exploration of qualitative factors. Furthermore, the study identified industry-specific, organizational, and costing-related themes as the main insolvency factor. This categorization enables future researchers to effectively identify the potential factors that can be addressed to mitigate insolvencies. Another key finding was the low attention past researchers have given to conducting research on insolvencies caused by poor costing practices, an area a construction practitioner can directly control. Accordingly, this research encourages future research to develop practical solutions to reduce insolvencies stemming from cost mismanagement. Through these findings, this research lays the groundwork for a sustainable and practical approach to mitigate construction insolvencies.

Keywords
Insolvency, construction industry, systematic literature review, Prisma method

1 Introduction

The construction industry (CI) plays a key role in the global economy by providing employment and driving demand for various goods and services (Assaad and El-Adaway 2020). Accordingly, Sousa *et al.* (2022) explained that investments across other economic sectors often rely on the performance of the CI. However, Guzikova *et al.* (2023) pointed out that this extensive connection with external sectors has made the CI vulnerable to various risks and uncertainties. Moreover, Kanapickienė *et al.* (2023) added that the unique inherent characteristics of the industry, like its fragmented nature, intense competition, and sensitivity to economic cycles, have worsened this vulnerability. Accordingly, these risks and uncertainties have increased the threat of insolvencies in the CI (Carson and Abbott 2012) . Coggins *et al.* (2016) believed that understanding the root causes of these insolvencies beforehand is pivotal to developing sustainable solutions. Most of the past research in this knowledge area has focused on developing statistical models to develop insolvency prediction models (Alaka *et al.* 2017). Conversely, some recent research has been directed toward exploring qualitative insolvency factors through systematic reviews (Assaad and El-Adawa 2020). However, a comprehensive categorization of these insolvency factors into meaningful themes and an understanding of the emerging trends of this knowledge are still lacking. Consequently, this research aims to fill this knowledge gap by combining a systematic review with a bibliometric analysis. Hence this research addresses two key research questions: RQ1. What are the prominent keywords, publication trends, and journals in construction insolvency? RQ2. What are the main categories of construction insolvency factors? Correspondingly, this study gives the research community a clear idea of the current research trend and potential future study areas. However, this research is limited to identifying qualitative insolvency factors.

2 Literature Review

The literature review starts with an overview of construction insolvencies and then describes the factors affecting insolvencies. Finally, this section explains the significance of this research paper.

2.1 Overview of Construction Insolvencies

The CI plays a vital role in the social and economic development of global economies (Al-Joburi *et al.* 2012). This industry is linked with other economic sectors and involves a complex network of interdependent stakeholders, including contractors, subcontractors, suppliers, and clients (Polat *et al.* 2014). Assaad and El-Adaway (2020) viewed this unique interconnectivity, which makes the CI complex in nature. Furthermore, the sensitivity to external factors such as economic cycles, competitive pressures, and dependency on progress payments exposes the CI to significant risks (Carson and Abbott 2012). Moreover, the intrinsic characteristics of the CI, such as thin profit margins, high leverage, cashflow challenges, cost blowouts, and a cyclical nature, render the industry vulnerable to failure (Herrera *et al.* 2020). As a result, global CI faced a surging threat of being insolvent over recent years (Polat *et al.* 2014). Construction insolvency is defined as the failure of firms to meet their financial obligations (Al-Joburi *et al.* 2012). Research by Coggins *et al.* (2016) denoted that the insolvency rate in CI notably exceeds other sectors' insolvencies. According to Sousa *et al.* (2022), construction insolvencies are triggered by factors like the sector's uniqueness, duration, uncertainty, and exposure to variations of economic fluctuations. Similarly, Adeleye *et al.* (2013) viewed construction insolvencies occur from a combination of factors rather than a single factor. Therefore, the underlying causes for insolvencies should be identified and remedied at the earliest (Polat *et al.* 2014).

2.2 Factors Affecting Construction Insolvencies

Alaka *et al.* (2017) asserted that the CI is plagued with risk factors that can cause insolvencies. Most construction firms run into insolvencies due to a lack of awareness of these causes (Herrera *et al.* 2020). Accordingly, a clear understanding of these causes is essential for maintaining the solvency of the construction firm (Polat *et al.* 2014). Many studies have been carried out to identify these insolvency factors (Assaad and El-Adaway 2020). Adeleye *et al.* (2013) stressed external factors, such as globalization, technological evolution, increased competition, regulation, and structural changes, as reasons for construction insolvencies. In contrast, Elexa *et al*. (2023) attributed insolvency risks to internal management and operational issues. Other studies viewed a combination of internal and external factors drives construction insolvencies (Adeleye *et al*. 2013). However, some research signifies that the impact of these factors depends on various factors like the firm's geographical location or the specialized trade (Assaad and El-Adaway 2020). Therefore, systematically identifying and categorizing the insolvency factors is essential for construction firms to pinpoint the most influential factor on the firm's solvency (Alaka et al. 2017).

2.3 Significance of Research

A considerable number of research studies have been conducted aiming to identify the causes of insolvencies (Adeleye *et al*. 2013). Most of these studies have developed statistical predictive models with financial ratios (Horta and Camanho 2013). One common issue in these studies is the reliance on financial statements, which are often inaccurate or unavailable in small firms (Chan *et al.* 2005). Moreover, these financial models are theoretical and rarely used in real-world practice. Conversely, some studies have identified qualitative factors through systematic review, yet these factors are generic and used to construct predictive models (Assaad and El-Adaway 2020). Moreover, none of the prior studies have identified the root cause of insolvencies or developed practical, real-world solutions (Alaka *et al*. 2017; Assaad and El-Adaway 2020; Holt 2013). The deficiency of applied research could be a reason for the surging number of construction insolvencies worldwide. As an initial step towards finding practical solutions, this study systematically categorizes the insolvency factors identified through past research. Accordingly, this study enables future researchers to identify insolvency factors that can be practically resolved. Hence, this research holds significance since it pioneers the concept of developing practical solutions to mitigate insolvencies.

3 Research Methodology

The research design is structured into three stages: (1) data acquisition and cleaning, (2) quantitative analysis using bibliometric tools, and (3) qualitative analysis through systematic literature review. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework was applied to ensure transparency in the publication screening process. Keywords were iteratively developed based on the research questions, with final terms including "liquidat* OR insolven* OR bankrup* AND 'construction indust*' OR 'building indust*'." These were used to search three prominent databases: SCOPUS, Massey Discover, and Business Source Complete. The search was conducted through Massey University Library to ensure access to full-text articles. Peer-reviewed journal articles published in English between 2000 and 2023 were included, ensuring the dataset captured key economic events like the 2007–2009 global financial crisis (Assaad and El-Adaway 2020). This process yielded 111 articles for the bibliometric analysis (Stage 2). In Stage 3, qualitative content analysis was performed on a final set of 51 articles.

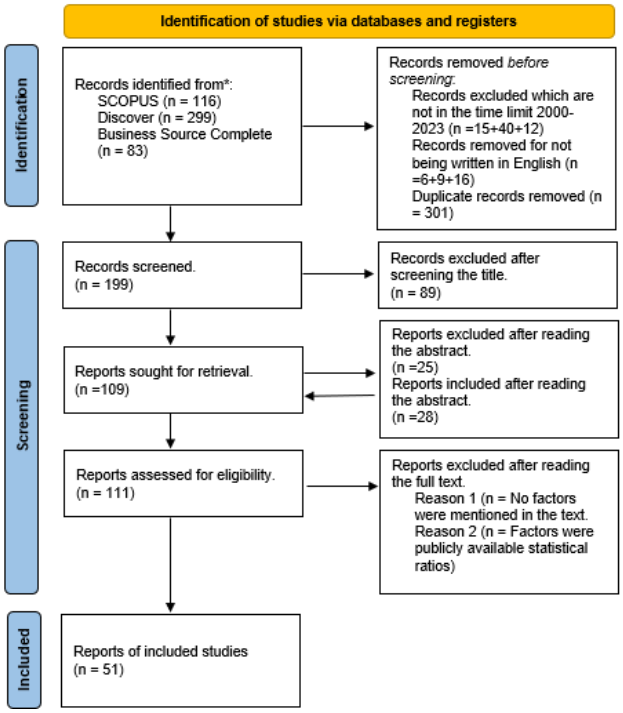


Figure 1 Screening of the articles using PRISMA.

4 Findings and Discussion

This section describes the results of the quantitative bibliometric analysis and the qualitative analysis.

4.1 Quantitative Analysis Results

The result of the quantitative analysis in terms of Annual publication trend, Occurrence, and Co-Occarance keywords is discussed in this section.

4.1.1 Annual Publication Trend

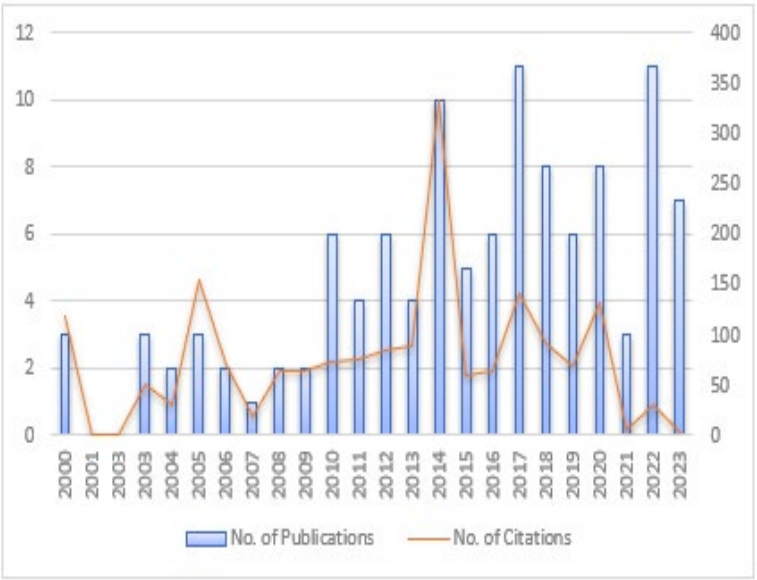


Figure 2 Annual publication trend

An increasing trend of interest in construction insolvency research from 2000 to 2023 was shown from the analysis of 111 journal articles. The first article on this field was published in 2000 in the European Journal of Purchasing & Supply Management, highlighting risks associated with construction insolvencies. 84% of the articles were published between 2010 and 2023, which signifies the growth of interest in this knowledge area after the 2007–2009 global financial crisis. A majority of 66% of articles published during 2014-2023 indicate that the research area has grown in popularity and that there is more ground to be explored. Conversely, the number of citations has shown a decline after 2014. This could be attributed to the time needed for new articles to gain citations or because the research area is yet to reach maturity. The outcomes of this section support the findings of, (Assaad and El-Adaway 2020; Coggins *et al.* 2016) that further research is needed in this subject area.

4.1.2 Occurrence and Co-Occurrence of Keywords

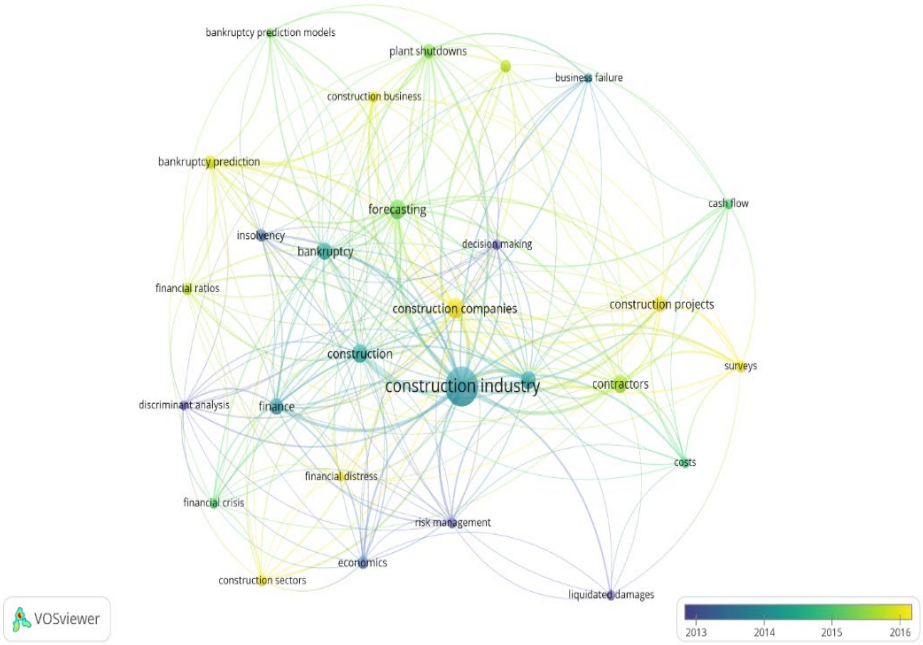


Figure 3 Keywords co-occurrence related to construction insolvency (Density visualization based on links between keywords.

Keyword occurrence and co-occurrence networks give an idea about the main research areas of a domain. In this study, the co-occurrence threshold was set at 5 in the Nvivo software, resulting in 28 keywords meeting this condition. The node's size signifies the keyword use frequency, and the distance between nodes reflects topic similarity. The colour of the node represents the annual publication year (APY). The keyword with the highest occurrences and links was ‘construction industry’ since the initial search was to find insolvency factors in the construction industry. Similarly, keywords in earlier publications, such as ‘bankruptcy,’ ‘finance,’ ‘business failure,’ and ‘insolvency,’ were more generic since the earlier research focused on finding construction insolvency factors. However, the keywords in the recent publications, including ‘construction companies’, ‘construction projects,’ ‘construction business,’ ‘cashflow,’ ‘finance,’ and ‘financial crisis,’ show a shift towards project-specific concerns. Moreover, this trend denotes that recent publications have identified the significance of costing and financial aspects in construction insolvencies. Moreover, the prevalence of keywords such as ‘bankruptcy prediction,’ ‘bankruptcy prediction models’, ‘financial ratios’, ‘risk management,’ and ‘forecasting’ indicates that the research in this area is more focused on developing statistical insolvency prevention models. However, these results highlight a research gap in identifying the root causes of insolvency and developing practical solutions to mitigate construction insolvencies.

4.2 Qualitative Analysis

This section analyzes the insolvency factors identified through the literature search. These insolvency factors were categorized into three broad themes. Accordingly, the first theme is construction industry factors, encompassing the various external factors that can significantly affect the firm's operations (Tripathi and Jha 2019). The second theme is the construction organization factors, including the internal variables within a construction firm, such as the firm's characteristics and the relationship with the client (Patel *et al.* 2022). Finally, the costing factors theme comprises factors on the firm's costing practice during the pre and post-contract stages (Alaka *et al.* 2017). The identified insolvency factors and the number of publications that acknowledged those factors are depicted in Figure 4.

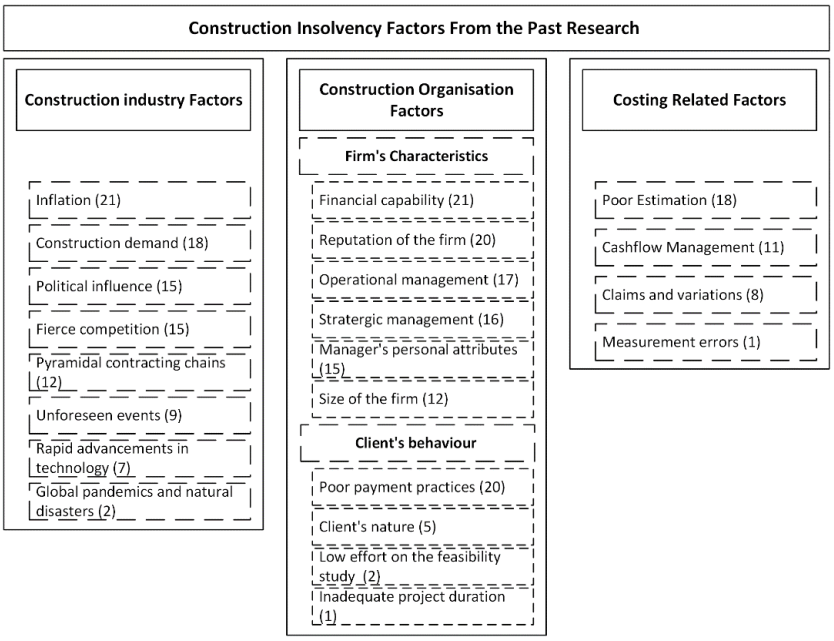


Figure 4 Insolvency factors identified under each research theme

4.2.1 Construction Industry Factors

40% of the previous research identified inflation as an insolvency factor. The rising costs of material and labour prices during inflation can result in insolvencies since these costs constitute a significant portion of construction expenses (Harada and Kageyama 2011). Moreover, inflation can cause the exchange rate to fluctuate, straining the project's cash flow, primarily when the project relies on imported materials (Tripathi and Jha 2019). Similarly, Abbasova *et al.* (2022) viewed that interest rate hikes driven by inflation can increase the debt burden in firms, leading to insolvency. Fluctuating construction demand was identified as an insolvency factor by 35% of articles. During an economic boom, firms try to overexpand by procuring excessive projects, and this unmanageable amount of workload exposes the firm to operational and financial risks that can cause insolvencies (Sánchez-Lasheras *et al.* 2012). Conversely, the scarcity of projects during an economic downturn depletes the cashflow of firms, making it impossible to retain staff or manage the debt obligations, further increasing insolvency risk (Tripathi and Jha 2019). 29% of the publications viewed political influence as contributing to insolvencies. The high influence of the external political environment on the construction performance renders the CI vulnerable to political reforms (Heo and Yang 2014). Changes in reforms like payment terms and contractual obligations impose unforeseen financial burdens, increasing the risk of insolvencies (Carson and Abbott 2012).

Half of the past research identified the fierce competition driven by many competitors in the market. Abbasova *et al.* (2022) highlighted that fierce competition often prompts firms to underbid and win projects, leading construction firms to function with thin profit margins. These thin profit margins reduce the firm's capacity to absorb the impacts of unforeseen costs or delays, ultimately increasing the insolvency risk (Harada and Kageyama 2011). The prevalence of pyramidal contracting chains is another insolvency factor identified by 23% of past research. Within the contracting chain, the lower-tier parties are significantly dependent on the actions and decisions of the upper-tier members (Coggins *et al.* 2016). Accordingly, delays or errors at higher tiers can convey a financial strain down the chain, threatening the financial solvency of depending firms (Holt 2013).

One-third of previous research viewed unforeseen events such as delays, cost escalations, and property damage as contributors to insolvencies (Patel *et al.* 2022). These risks are exceptionally high when firms take on projects in unfamiliar locations or deal with new subcontractors or unknown geological conditions (Holt 2013). Additionally, 13% of research highlighted that rapid advancements in technology as an insolvency factor since the firm's failure to adopt innovative technologies can cause a competitive disadvantage, increasing financial difficulties (Chan *et al.* 2005). 4% of publications highlighted the impact of global pandemics and natural disasters on insolvencies. Pandemics can challenge the solvency of firms by disrupting supply chains, reducing labor availability, and creating contractual complexities. Correspondingly, natural disasters cause supply shortages and regulatory complications, risking the firm’s solvency (Adel *et al.* 2022). Given these factors' external nature, firms cannot mitigate the impact through conventional solutions. Hence, the firm's only defence mechanism is to minimize errors in the construction practice and solidify the financials to absorb the impact of these external influences.

4.2.2 Construction Organization Factors

40% of past research identified the significance of a firm’s financial capacity on insolvency. Accordingly, undercapitalized firms often seek additional loans to supplement the cashflows (Alcalde *et al.* 2022). The financial burden of these loans ultimately leads the firm’s profit margins to be diminished, leading to insolvencies (Al-Mhdawi *et al*. 2023). Additionally, three quaters of research signified the influence of firms' reputations on insolvencies. Firms with established reputations are less likely to be insolvent as they are better positioned to secure projects and attract finances given the favorable standing among clients (Alcalde *et al.* 2022). These firms have better access to acquire loans to navigate through financial strains, further solidifying the solvency (Adel *et al.* 2022). Operational management was highlighted as an insolvency factor by 33% of the previous studies. Operational management refers to the method of construction activities being administered (Heo and Yang 2014). Ineffective management of operational activities can strain client relationships and disrupt project timelines, which in turn increase insolvencies (Sánchez-Lasheras *et al.* 2012). To avoid such risks, firms should improve operational management by adequately managing risks, attracting capable staff, and ensuring strong financial management (Alcalde *et al.* 2022). Strategic management encompassing pre-project planning and long-term decision-making was identified by 31% of insolvency-related publications. Thomas Ng *et al.* (2011) viewed strategic management flaws, including inconclusive strategic plans or underestimating competition and market conditions, can improve insolvency risk. These insolvency risks can be reduced by progressive strategic management initiatives, including anticipating economic changes, adapting technological advancements, and enhancing resource allocation (Zayed and Liu 2014).

Three-fourths of studies highlighted the impact of managers' attributes on construction insolvencies. Gamil *et al*. (2022) viewed that a manager’s attributes directly contribute to the firm's solvency through effective decision-making. Accordingly, autocratic leadership can hinder decision-making, while

experienced and adaptable managers are more likely to identify opportunities and mitigate threats (El-adaway *et al*. 2018). 23% of publications identified the firm's size as an insolvency factor. Coggins *et al.* (2016) viewed small-scale firms as often burdened with higher risks, increasing their vulnerability to insolvencies. Lack of experienced staff in small firms further contributes to insolvency risk (Polat *et al.* 2014). Furthermore, limited technical competency is another attribute of these firms, causing insolvencies (Gamil *et al.* 2022). 38% of the past publications identified poor payment practices as an insolvency factor. CI's cascading payment system, in which payments flow from the client to the main contractor and subsequently to the, poses a threat of insolvency on lower tiers if the payments are delayed or held back (Zayed and Liu 2014). One-fifth of articles identified the client's attributes, like frequent scope changes and delayed inspections, contributing to insolvencies (Al-Mhdawi *et al.* 2023). Moreover, 3.8% of the past research pointed out that the low effort in the feasibility study as an insolvency factor, causing financial uncertainty by introducing unforeseen risks (Abbasova *et al.* 2022). 1.9% of past research viewed inadequate project durations as an insolvency factor that leads to cost overruns, cash flow issues, and reputational damage (Zayed and Liu 2014). The factors presented in this theme are either highly engraved to the construction firm from inception or relevant to the client's behavior. Therefore, it is hard to mitigate the impact of these factors on insolvency at the construction project level. The only way a construction firm can mitigate these factors is to maintain a transparent relationship with the client or reform the firm's characteristics.

4.2.3 Costing-related Factors

Amoah and Bikitsha (2022) signified the importance of cost estimation in construction insolvencies. Accordingly, three-fifth of publications identified poor estimation factors as an insolvency factor. Similarly, Polat *et al.* (2014) emphasize that construction firms should be cautious when performing estimation practices, given the high dependence of the firm's solvency on the budget. Most insolvencies occur when construction firms engage in relentless bidding wars during high competition (Abbasova *et al.* 2022). In such situations, the estimators would commit inaccuracies in the estimation, including errors in bid preparation, unrealistic pricing, and incorrect rates (Waddle 2009). Such errors can impact the cash flow of the firm during the post-construction stage, leading firms to insolvencies (Waddle 2009). Karas and Režňáková (2017) highlighted the intrinsic challenges of the CI, including payment delays and fluctuating construction demand, makes the accurate cost estimation crucial for the firm's survival. Cash flow management was identified as an insolvency factor by 22% of publications since inefficient cost control leads firms to financial difficulties (Abbasova *et al*. 2022). Accordingly, Patel *et al.* (2022) viewed faulty costing practices like poor documentation of expenses, inadequate monitoring of profitability, and insufficient allocation of indirect costs mainly cause cash flow issues. Moreover, Assaad and El-Adaway (2020) highlighted accounting errors and delays in financial reports as causes for cash flow issues. One-third of publications identified inaccuracies of claims and variations process as an insolvency factor (Elexa *et al*. 2023). Accordingly, Patel *et al.* (2022) expressed that errors like insufficient supporting evidence for interim claims could cause delayed or reduced payment, jeopardizing cashflows and insolvencies. Furthermore, insufficiencies in the variation process could lead the firms to face diminished profit margins and eminent insolvencies (Zayed and Liu 2014). Inaccuracies in the measurements were the least identified insolvency factor; however, this factor can inflict financial burdens on the firms by creating discrepancies between estimated and actual quantities (Waddle 2009). Therefore, from the findings of this research, it is clear that the costing factors theme has the minimum amount of research carried out in this knowledge area. Similarly, construction industry features and organization factors are hard to control from a construction practitioner's perspective to reduce insolvency. Hence, costing practices are the only impactful theme contributing to applied insolvency prevention. Therefore, future research should focus on discovering real-world implications for reducing construction insolvencies.

5 Conclusions and Further Research

This paper is the first to combine a systematic literature review with a bibliometric analysis to explore the trends and published knowledge in the construction insolvencies research domain. Accordingly, the bibliometric analysis addressed RQ1, identifying a growing trend of research in the knowledge area during recent years. Most of this research focuses on developing statistical models for insolvency prediction using financial ratios. Similarly, RQ2 was addressed through the qualitative review, which categorized the identified insolvency factors into three meaningful themes: (1) Construction industry factors, (2) Construction organization factors, and (3) Costing factors. Furthermore, the qualitative review revealed that the costing factors theme had the least research published despite being most amenable to practical control of insolvencies at a construction firm level. Hence, further research can be suggested to develop practical solutions to mitigate construction insolvencies related to the factors of this theme. Accordingly, a step-by-step systematic guide to enhancing the costing practice throughout the phases of a project can be suggested as a practical approach to future research. Incorporating relatively straightforward bibliometric techniques and confining the literature search to specific academic sources are limitations of the study. Therefore, addressing these limitations in future research will offer a more comprehensive field view.

6 Acknowledgment

This research was funded by the Building Research Levy provided by BRANZ, New Zealand

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