AFFECTING ANALYSIS OF BUSINESS RISK FACTORS TO PROFITABILITY OF CONSTRUCTION COMPANIES IN VIETNAM

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Abstract - Risk management in the construction sector in Vietnam has received much research attention in recent years. However, in-depth studies on the impact of business risk factors on the financial performance of domestic construction enterprises are still limited. This study focuses on measuring and analyzing the impact of business risk factors on the profitability of construction enterprises in Vietnam in recent years. Multivariate linear regression method is used to measure the impact of business risk factors based on the financial statement data set of 60 medium and large construction enterprises listed on the Vietnamese stock market from 2018 to 2023. The research results show that enterprises with better risk management capabilities often achieve higher financial performance. The study proposes a number of solutions to improve profitability through multidimensional risk identification and management, helping businesses develop effective response strategies and thereby optimize profits.

Key words - Business risk; construction industry; profitability; risk management; Vietnam companies

1. Introduction

The construction industry is a challenging field where businesses face various types of risks, including financial, technical, legal, and environmental risks. Understanding and managing these risks is crucial for maintaining and enhancing profitability. Effective risk management not only helps businesses avoid potential losses but also facilitates sustainable and stable development.

In international research, risk management in the construction industry has been addressed from various perspectives. Abel, S., & Le Roux, P. [1] and Menicucci, E., & Paolucci, G. [2] emphasize the importance of internal factors such as size, risk management, and assets in determining profitability. Studies [3-4] expand on this, indicating that macroeconomic factors like inflation, GDP growth, and economic policy also significantly impact profitability, especially in crisis contexts like COVID-19. Additionally, the roles of liquidity and debt in maintaining operations during crises have been highlighted [5-6]. Hu, S., & Zhang, Y. [7] also point out that economic crises can negatively affect businesses' profits, particularly when revenue sources are disrupted. Overall, the interplay between internal and macroeconomic factors is a decisive element in determining profitability in fluctuating economic conditions.

In Vietnam, research on risk management in the construction industry has made certain progress but remains limited in both quantity and scope. Most studies focus on analyzing business risk factors that affect the profitability of Vietnamese commercial banks. Research [8-9] emphasizes that income from non-credit activities and asset management plays a crucial role in improving profitability, while [10-11] indicates the relationship between net interest margins and revenue diversification in risk management. Additionally, macroeconomic factors such as inflation and economic growth, discussed by [12-13], also significantly impact the operational efficiency of banks. Overall, profitability depends on both internal factors and macroeconomic conditions, requiring a balance between risk and effective management. Many studies primarily focus on assessing technical and legal risks in construction projects, without adequately addressing other types of risks such as financial, environmental, and social impacts in both domestic and international contexts.

This underscores the urgent need for more extensive research to provide detailed and specific information, thereby helping businesses develop more effective risk management strategies. This study offers a comprehensive view of the issue, enabling companies to formulate better risk management strategies, which in turn enhances competitiveness and promotes sustainable development in the construction industry.

2. Literature review

2.1. Definition of Business Risk

Business risk refers to the likelihood of adverse events or conditions occurring that could negatively impact a company's operations. For construction businesses, risks can arise from financial, operational, legal, and environmental factors. Effective risk management is a key element that helps companies stabilize and achieve sustainable growth. This requires a comprehensive and flexible risk management strategy aimed at enhancing responsiveness and minimizing the negative impacts of potential risks during business operations.

2.2. Profitability of the Business

Profitability refers to a company's ability to generate profits from its business activities, reflected in the effective use of capital and assets. A company with good profitability is one that generates returns exceeding its investment costs.

Profitability is an important metric for measuring business efficiency, typically represented by the return on equity (ROE) and return on assets (ROA). ROE indicates the level of return on shareholders' equity, reflecting the efficiency of capital utilization. ROA measures how

effectively a company uses its assets to generate profits, helping to assess overall operational efficiency. Analyzing these metrics allows businesses to identify strengths and weaknesses, supporting strategic decisions for profit improvement and sustainable development.

ROA and ROE are two closely intertwined indicators. When evaluating a company's financial situation, investors need to consider both metrics for the most accurate assessment.

2.3. Theoretical Basis of Linear Regression Method

The linear regression method is a statistical technique used to model the linear relationship between a dependent variable and one or more independent variables. The primary goal of linear regression is to find an equation that predicts the value of the dependent variable based on the values of the independent variables. It is a mathematical model where the dependent variable is expressed as a linear function of the known independent variables. For example, suppose you have data on your expenses and income from the previous year. The linear regression technique analyzes this data and determines that your expenses are half of your income. It then calculates a future, unknown expense by taking half of the known future income.

The multivariate linear regression model represents the relationship between the dependent variable:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \epsilon \quad (1)$$

In which:

Y: The dependent variable that we want to predict or explain.

X_1, X_2,..., X_k: The independent variables, which are the factors used to predict or explain Y.

β_0: The intercept, representing the value of Y when all independent variables are equal to zero.

β_1, β_2,..., β_k: The regression coefficients, indicating the extent of influence each independent variable has on the dependent variable.

ϵ: The error term, representing random factors or unmeasured variables.

The study combining quantitative and qualitative research methods [14] can provide deeper insights into the business risk factors affecting profitability.

3. Research Methodology

3.1. Data Collection and Processing

Sample size is a crucial issue when using multivariate regression analysis. The formula for calculating the sample size for multivariate regression analysis is as follows [15]:

$$n \geq 50 + 8p \quad (2)$$

In which n represents the minimum sample size needed, and p denotes the number of independent variables in the model.

Based on a synthesis of related studies [16-19], this research proposes a research model consisting of the following independent variables: (1) Operating profit margin, (2) Capital structure, (3) Business risk, (4) Firm size, (5) Quick liquidity ratio, and (6) Inventory turnover. Therefore, to apply the multivariate regression analysis method, this study needs to collect at least 98 samples.

The data in this study were collected from the financial reports of 60 small and medium-sized enterprises in the construction sector operating in Ho Chi Minh City and listed on the Ho Chi Minh Stock Exchange from 2018 to 2023. The selection of these companies was conducted randomly to eliminate bias and enhance the representativeness of the population. The collected data feature a combination of cross-sectional and time-series data. The cross-sectional data consist of 60 construction companies in Ho Chi Minh City, while the time series covers a period of 5 years (2018, 2019, 2020, 2021, and 2023). Accordingly, the total sample size for analysis includes 60×5=300 observations, meeting the minimum sample size requirement.

After sufficient data has been collected, the processing phase will involve data cleaning, database construction, and statistical analysis to calculate indicators representing the dependent variable-measuring the profitability of the enterprises. Careful and accurate data processing will ensure that the analysis results are highly reliable, thus providing appropriate recommendations to improve the business performance of construction companies. Detailed information on the calculation and formation of the variables in the research model is presented in Table 1.

Table 1. *Variables in the Research Mode*

Variable	Symbol	Calculation Formula	Expected Correlation
Profit margin	BLN	EBIT/Net revenue	+
Capital structure	CCV	Liabilities/Total asset	+/-
Business risk	RRKD	Logarithm (Net revenue)	+/-
Firm size	QM	Logarithm (Total asset)	+
Quick liquidity ratio	TK	(Current asset - Inventory) / Current liabilities	+
Inventory turnover	VQ	Cost of goods sold/ Average inventory	+

Source: Author's compilation

3.2. Research Methodology

Referencing previous similar studies and interviewing industry experts in construction [20-21], quantitative analysis will utilize regression models to assess the impact of risk factors on the profitability of enterprises. Based on the influencing factors identified in prior research, both domestic and international, the authors have developed a regression model with the following independent and dependent variables:

$$Y_i = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + e_i \quad (3)$$

Trong đó:

Y: The return ratios measured by ROA *(Return on Assets*) and ROE *(Return on Equity)* of the enterprise.

i: The i^{th} enterprise.

β_0: The intercept (constant term).

X_1: Profit margin.

X_2: Capital structure.

X_3: Firm size.

X_4: Business risk.

X_5: Quick liquidity.

X_6: Inventory turnover.

e_i: The random error, arising from various sources beyond the control of the research system.

These data were calculated based on audited financial statements from 2018 to 2023 (excluding 2022); they were then entered into an Excel spreadsheet, transferred to SPSS, and processed using SPSS version 20.0.

4. Results and Discussion

4.1. Analysis of Linear Regression Results for ROA Independent Factors

The linear regression results for the independent factor ROA calculated by the authors are as follows:

Table 2. *ROA Regression Coefficients*

Factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlation Statistics	
	Coefficient	Standard Error				Tolerance	VIF
Constant	1.462	1.416		1.032	0.300		
BLN	0.826	0.166	0.274	4.976	0.000	0.893	1.120
CCV	-6.087	1.385	-0.262	-4.400	0.000	0.765	1.310
RRKD	2.570	0.346	1.120	7.419	0.000	0.119	8.410
QM	-2.100	0.349	-0.891	-6.030	0.000	0.124	8.050
TK	0.004	0.002	0.143	2.462	0.010	0.808	1.240
VQ	0.002	0.003	0.043	0.803	0.420	0.967	1.030

The Sig. value from the t-test is used to assess the significance of the regression coefficient. If the Sig. value for the regression coefficient of an independent variable/ factor is < 0.05, we conclude that the independent variable/ factor has an impact on the dependent variable/ factor.

The results run on SPSS yielded Table 2, which shows that the quick liquidity ratio and inventory turnover have independent variable factors with Sig. values > 0.05. Therefore, the quick liquidity ratio and inventory turnover do not have an impact on the dependent variable ROA. Since these two factors do not affect ROA, we exclude both variables and rerun the linear regression model, resulting in the findings presented in Table 3.

The analysis of the linear regression coefficients from Table 3 shows that the overall Sig. values for the independent factors are all less than 5%, indicating that the four factors profit margin, capital structure, business risk, and firm size are significant at the 5% level, or in other words, achieve a 95% confidence level in the model, demonstrating their impact on ROA.

The regression equation illustrating the relationship between the factors is as follows:

- In terms of unstandardized coefficients:

$$ROA = 1{,}575 + 0{,}765 \times BLN - 6{,}119 \times CCV + 2{,}180 \times RRKD - 1{,}732 \times QM + ei$$

- In terms of standardized coefficients:

$$ROA = 0{,}253 \times BLN - 0{,}283 \times CCV + 0{,}950 \times RRKD - 0{,}734 \times QM + ei$$

Table 3. *Regression coefficients after removing variables that do not affect the dependent variable*

Factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlation Statistics	
	Coefficient	Standard Error	Beta			Tolerance	Coefficient
Constant	1.575	1.426		1.104	0.270		
BLN	0.765	0.166	0.253	4.613	0.000	0.912	1.097
CCV	-6.119	1.380	-0.263	-4.435	0.000	0.783	1.278
RRKD	2.180	0.313	0.950	6.959	0.000	0.148	6.775
QM	-1.732	0.319	-0.734	-5.422	0.000	0.150	6.659

Based on the regression model results, business risk has the strongest positive impact on ROA. This means that as business risk increases, ROA also increases. This is evidenced by the standardized regression coefficient of +0.950, indicating that for every one-unit increase in ROA, business risk increases by +0.950 units. The second factor is the profit margin, with a coefficient of +0.253, which also has a positive effect on ROA but is not as strong as the impact of business risk.

The two factors that have a negative impact on ROA are capital structure and firm size, with coefficients of -0.283 and -0.734, respectively. This means that for every one-unit increase in ROA, the capital structure and firm size will decrease by -0.283 and -0.734 units, respectively. This suggests that for construction companies in Vietnam, to increase ROA, they must enhance profit margins and business risk while reducing capital structure and firm size.

4.2. Analysis of Linear Regression Results for Independent Factors Affecting ROE

The results in Table 4 indicate that the quick liquidity ratio and inventory turnover have independent variable factors with Sig. values > 0.05. Therefore, the quick liquidity ratio and inventory turnover do not have an impact on the dependent variable ROE. Since these two factors do not affect ROE, we exclude both variables and rerun the linear regression model, resulting in the findings presented in Table 5.

The analysis of the linear regression coefficients from Table 5 shows that the overall Sig. values for the independent factors are all less than 5%, indicating that the four factors-profit margin, capital structure, business risk, and firm size-are significant at the 5% level, or in other words, achieve a 95% confidence level in the model, demonstrating their impact on the dependent variable ROE.

Table 4. *ROE Regression Coefficients*

Factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlation Statistics	
	Coefficient	Standard Error				Tolerance	Coefficient
Constant	7.969	5.443		1.464	0.144		
BLN	11.79	0.639	0.686	18.436	0.000	0.893	1.120
CCV	32.00	5.324	0.242	6.012	0.000	0.765	1.307
RRKD	-6.732	1.332	-0.515	-5.055	0.000	0.119	8.412
QM	4.676	1.340	0.348	3.489	0.001	0.124	8.054
TK	-0.012	0.006	-0.075	-1.913	0.057	0.808	1.238
VQ	-0.019	0.011	-0.062	-1.736	0.084	0.967	1.034

Table 5. *ROE Regression Coefficients After Excluding Non-Significant Variables*

Factors	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	Correlation Statistics	
	Coefficient	Standard Error				Tolerance	Coefficient
Constant	7.542	5.481		1.376	0.170		
BLN	12.000	0.637	0.698	18.823	0.000	0.912	1.097
CCV	31.262	5.303	0.236	5.896	0.000	0.783	1.278
RRKD	-5.410	1.204	-0.414	-4.494	0.000	0.148	6.775
QM	3.447	1.227	0.005	2.808	0.005	0.150	6.659

The regression equation representing the relationship between the factors is as follows:

- Using unstandardized coefficients:

$$ROE = 7{,}542 + 12{,}000 \times BLN + 31{,}262 \times CCV - 5{,}410 \times RRKD + 3{,}447 \times QM + ei$$

- Using standardized coefficients:

$$ROE = 0{,}698 \times BLN + 0{,}236 \times CCV - 0{,}414 \times RRKD + 0{,}257 \times QM + ei$$

For ROE, based on the results of the regression model, we can see that profit margin, capital structure, and firm size all have a positive impact on ROE, with standardized regression coefficients of +0.698, +0.236, and +0.257, respectively. This means that for every one-unit increase in ROE, the profit margin increases by +0.698 units, the capital structure increases by +0.236 units, and firm size increases by +0.257 units. Among these, the profit margin has the strongest and most significant positive effect on ROE.

The factor that has a negative impact on ROE is business risk, with a regression coefficient of -0.414. This means that for every one-unit increase in ROE, business risk decreases by -0.414 units. This suggests that for construction companies in Vietnam, to increase ROE, they should focus on enhancing profit margins, capital structure, and firm size, particularly by increasing profit margins and reducing business risk.

5. Proposing solutions to Enhance Profitability for Construction Enterprises in Vietnam

The study proposes several solutions to enhance profitability by identifying and managing risks in a multidimensional manner. This approach will assist construction companies in developing effective response strategies, enabling them to optimize their profits.

5.1. Financial Aspects

5.1.1. Financial Risks

Financial risk can lead to high capital costs, negatively impacting profitability. For instance, when interest rates rise or a company becomes excessively leveraged, financial costs increase, reducing net profits. Furthermore, ineffective management of debt and cash flow can also elevate financial risk, making it challenging to meet debt obligations and maintain business operations.

5.1.2. Cash Flow Risks

Cash flow risk is a crucial factor that businesses need to pay attention to. When facing difficulties in capital recovery, companies may experience liquidity shortages, forcing them to cut costs or suspend projects, which in turn leads to decreased profitability. A lack of liquidity not only affects the ability to meet debt obligations but also reduces the capacity to invest in new business opportunities, thereby losing competitive advantage. Moreover, cost-cutting measures can impact product quality, leading to decreased customer satisfaction and credibility. In severe cases, liquidity shortages can result in bankruptcy. Therefore, businesses need to improve their debt recovery processes, optimize inventory management, and maintain financial reserves to mitigate this risk.

5.2. Operational Aspects

5.2.1. Project Risks

Delays and cost overruns are common issues in construction projects, leading to increased expenses and reduced profitability. When projects fall behind schedule, companies face not only higher labor and material costs but also potential contract penalties and a loss of reputation. Cost overruns can stem from design changes, rising material prices, or ineffective management practices.

These issues not only impact short-term profitability but also create long-term financial challenges, diminishing the competitiveness of the company. To mitigate risks, businesses need a robust project management plan that includes monitoring progress, controlling costs, and effectively utilizing technology and project management software.

5.2.2. Supply Chain Risks

Disruptions in the supply chain can increase material costs, reducing profit margins. This is particularly significant for construction companies that rely on imported materials. When the supply chain is disrupted, businesses may face shortages of materials, forcing them to purchase from alternative sources at higher prices.

Supply chain disruptions not only increase production costs but can also cause delays in construction schedules, affecting the ability to complete projects on time. If businesses rely on unreliable suppliers, the quality of materials may also decline. To mitigate this risk, companies should build a flexible supply chain and diversify their sources of supply. Maintaining a reserve inventory and establishing strategic partnerships with multiple suppliers can also help businesses respond more effectively to supply chain disruptions.

5.3. Market Aspects

5.3.1. Competitive Risks

Intense competition forces businesses to lower prices or increase marketing costs, which reduces profit margins. For construction companies, maintaining market share in a highly competitive environment is a significant challenge. When forced to cut prices to compete, businesses may struggle to maintain their desired profit levels. Additionally, rising marketing expenses aimed at attracting new customers and retaining existing ones further increase operational costs, impacting profit margins.

Additionally, competition requires businesses to continuously improve service and product quality, invest

in technology, and train personnel, all of which increase costs. To overcome this challenge, construction companies need to develop effective competitive strategies, such as focusing on quality, customer service, and building a strong brand. Implementing advanced technologies and efficient management practices can also help businesses enhance their competitiveness and maintain market share in a volatile business environment.

5.3.2. Demand fluctuations

When construction demand decreases, companies may face a shortage of contracts, leading to reduced revenue and profits. This decline can result from various factors, such as economic downturns, changes in public investment policies, or fluctuations in the real estate market. With fewer projects, businesses not only lose their primary income source but also have to bear high fixed costs, including expenses related to maintaining personnel and equipment.

This situation can lead to losses and affect the financial stability of the business. To respond, construction companies need to be flexible in adjusting their strategies, such as exploring new markets, diversifying services, or focusing on smaller, more stable projects. Maintaining good relationships with clients and enhancing service quality can also help businesses stay competitive and navigate challenging periods.

5.4. Management Aspects

5.4.1. Management Risks

Poor management can lead to numerous negative consequences, including making erroneous decisions, reducing operational efficiency, and diminishing a company's profitability. When project management is ineffective, delays occur, costs escalate, and the quality of work suffers. Additionally, lax financial management can result in budget deficits and challenges in maintaining stable cash flow. Furthermore, weak internal governance can create conflicts and diminish coordination within the company.

5.4.2. Investment Strategies

Investing in unprofitable projects can have serious consequences, including capital losses and a decline in the overall profitability of the business. When a company allocates resources, time, and finances to ineffective projects, it not only loses the initial investment but also misses out on other potential business opportunities. This weakens the company's financial foundation and negatively impacts its long-term sustainable development.

5.5. Legal and Regulatory Aspects

5.5.1. Legal Risks

Legal risks in the construction industry are related to potential legal issues that may arise during project execution, including contract violations, disputes with partners, and compliance with regulations. Breaching legal requirements can lead to litigation costs, fines, and negatively impact the company's reputation. Sudden changes in legal regulations can also increase operational costs and reduce profitability.

5.5.2. Environmental regulations

The construction industry must comply with strict environmental regulations, and non-compliance can lead to significant fines and additional costs, reducing profitability. While this may present challenges, adhering to these regulations also offers opportunities for sustainable development and enhancing reputation. Companies need to proactively understand and adapt to environmental regulations to optimize operations and minimize risks.

5.6. Environmental Aspect

5.6.1. Technology Risk

Technological risks are a crucial factor that construction companies need to manage carefully. Such risks can lead to operational disruptions, data loss, and financial damage, ultimately reducing profitability. By identifying and responding promptly to these risks, businesses can protect their profits, maintain operational efficiency, and enhance their competitiveness in the market.

5.6.2. Technology Innovation

Delays in adopting new technologies can cause businesses to lose their competitive edge, reduce operational efficiency, and decrease profitability. Falling behind on trends leads to wasted resources, increased costs, and missed growth opportunities. Embracing technological innovation enables construction companies to enhance performance, improve product quality, reduce costs, enhance safety, and better meet market demands, allowing them to survive and thrive in a fiercely competitive environment.

6. Conclusion and Recommendations

The study indicates that ROA is most strongly affected by business risk, followed by profit margin, with both factors positively influencing ROA. Conversely, capital structure and firm size have a negative impact on ROA. Therefore, it can be concluded that if Vietnamese construction companies wish to increase their ROA, they should focus on enhancing business risk and profit margins while reducing capital structure and firm size.

The factors affecting ROE are profit margin, capital structure, and firm size, with profit margin having the strongest positive influence on ROE. In contrast to ROA, business risk negatively impacts ROE. Therefore, it can be inferred that for Vietnamese construction companies aiming to increase their ROE, they should focus on enhancing profit margins, capital structure, and firm size while simultaneously reducing business risk.

Based on the research results, the author recommends that businesses invest in the following risk prevention measures:

Business Risk Management: Businesses need to develop and implement effective risk management policies to minimize the negative impacts of business risks. Regularly assessing potential risk factors in business operations will help companies respond more promptly and effectively..

Optimizing Profit Margins: Businesses should focus on improving profit margins by enhancing product/service

quality, optimizing production processes, and minimizing costs. Reasonable promotional programs and flexible pricing strategies will also help increase profitability from assets..

Reasonable Capital Structure: Businesses should assess and adjust their capital structure to optimize profits and reduce financial costs. Maintaining a suitable debt ratio will provide the necessary resources for investment and growth while mitigating financial pressure.

Training and Enhancing Employee Competence: To effectively manage risks and optimize profit margins, businesses need to invest in employee training. Improving the skills and knowledge of the workforce will enable them to identify and respond promptly to risk factors in business operations.

Monitoring and Evaluating Performance: Businesses should establish a regular monitoring and evaluation system to gain an overview of their financial situation and profitability. This will help identify issues early and adjust strategies promptly.

Encouraging Innovation and Creativity: To improve profitability, businesses should promote innovative ideas and creativity in their production and business processes. Adopting new technologies and enhancing processes can create competitive advantages and increase value for the company.

The research has shown that financial, operational, market, management, legal, environmental, and technological risks can all impact a company's profitability. Therefore, construction businesses need to conduct a comprehensive assessment and effectively manage these risks to maintain and enhance their profitability.

Future research could focus on developing predictive models of profitability based on specific risk factors in the construction industry. Additionally, the study should examine effective risk management strategies that have been successfully implemented in the industry and could be replicated for other businesses. This could help clarify the relationship between risk and profitability and provide practical solutions for construction companies in Vietnam.

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