

# Risk factors affecting the bidding process of construction investment projects in Ho Chi Minh City

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## KEYWORDS

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## ABSTRACT

Bidding is a critical stage in construction investment project management because it directly influences contractor selection, capital utilization, project schedule, and construction quality. In practice, the bidding process is simultaneously affected by multiple categories of risks associated with documentation, legal issues, economic conditions, technical matters, and finance. This study aims to identify and measure the effects of risk factors on the bidding process of construction investment projects in Ho Chi Minh City. Data were collected from 170 valid survey responses obtained from individuals involved in management, technical, and bidding activities in the construction sector. Quantitative analytical methods were employed, including Cronbach's Alpha reliability testing, Exploratory Factor Analysis (EFA), Pearson correlation analysis, and multiple linear regression. The results indicate that the research model comprises five statistically significant groups of risk factors, namely documentation procedures, legal procedures, economic factors, technical design, and financial factors. After scale refinement, the final model retained 19 observed variables and explained 50.7% of the variance in bidding risk. Among these factors, technical design exerted the strongest effect, followed by documentation procedures, economic factors, legal procedures, and financial factors. The findings provide a practical basis for project owners, procuring entities, and contractors to prioritize the control of critical risk factors, thereby improving the effectiveness of bidding activities in construction investment projects.

## 1. Introduction

In construction investment projects, bidding plays a decisive role in the effectiveness of contractor selection and the overall quality of project management. Vietnam's current legal framework for contractor selection is established under the Law on Bidding No. 22/2023/QH15, while its implementation is guided by Decree No. 214/2025/ND-CP. In addition, construction investment activities are also governed by the Law on Construction No. 50/2014/QH13 and Law No. 62/2020/QH14, which amends and supplements a number of articles of the Law on Construction [1–4].

By nature, bidding in construction is not merely an administrative or legal procedure; it is also a decision-making process under conditions of uncertainty. At this stage, the participating parties must simultaneously address a wide range of issues, including technical requirements, tender documents, financial capacity, bid prices, evaluation criteria, and legal constraints. If these elements are inadequately prepared or lack consistency, risks arising during the bidding stage may extend into the contract implementation stage, leading to cost overruns, schedule delays, disputes, and reduced investment efficiency [5].

Previous studies have shown that risk in construction is multidimensional and emerges at a very early stage of the project life cycle. Edwards and Bowen argued that risk management in construction should be implemented from the beginning of the project rather than only when construction begins [5]. From the bidding perspective, Pham et al. emphasized that, in design-build projects in Vietnam, risks related to documentation, design, contracts, cost, and schedule during the tendering stage directly affect contractors' decisions to participate in bidding [6]. Similarly, Hanák et al. found that bidding strategies in public construction procurement are strongly influenced by the level of competition, package conditions, and firms' ability to maintain economic stability [7].

Against this background, this paper addresses the following question: Which groups of factors affect bidding risk in construction investment projects in Ho Chi Minh City, and to what extent do they affect it? The study contributes to the literature in two ways. First, it integrates five groups of bidding-related risks (documentation procedures, legal procedures, economic factors, technical design, and financial factors) into a single empirical model. Second, it provides evidence from the context of Ho Chi Minh City, thereby offering practical implications for project owners, procuring entities, and contractors in prioritizing risk control at the bidding stage.

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## 2. Literature Review

### 2.1. Risk in construction and risk during the bidding stage

Foundational studies on construction risk management consistently suggest that risk is multidimensional and extends from project preparation to construction and operation. Edwards and Bowen argued that construction risks may arise from technical, estimating, organizational, financial, and institutional sources, and that decisions made at the early stages of a project may generate long-term consequences throughout the project life cycle [5]. From this perspective, the bidding stage should be regarded as a critical point in risk management because it is the stage at which substantial project information is embedded in tender documents, bid dossiers, and contracts.

In the Vietnamese context, Pham et al. showed that in design-build projects, identifying risks during the tendering stage is particularly important because information related to contracts, costs, schedules, and design directly affects contractors' decisions and project outcomes [6]. This finding reinforces the argument that bidding risk is not merely procedural in nature but also managerial.

### 2.2. Groups of risk factors commonly identified in the literature

One stream of research emphasizes the role of the quality of tender documents and bidding-related information. The quality of tender documents, the clarity of evaluation criteria, the time available for bid preparation, and the ability to respond to clarification requests are considered conditions that directly affect the fairness, transparency, and effectiveness of contractor selection. Hanák et al. pointed out that contractors often make decisions based on multiple criteria, among which package attractiveness, the level of competition, and cost estimation capability play significant roles [7]. This suggests that risk associated with documentation procedures is an important factor group that should be examined separately.

The second group is legal risk. Mitchell and Agapiou showed that in public construction procurement, legal challenges are manifested not only in court disputes but also in various forms of complaints, petitions, and objections that delay the contractor selection process [10]. Their study also indicated that issues related to quality evaluation and abnormally low tenders may contribute to heightened legal challenges. This implies that legal risk in bidding should be viewed as a substantive operational risk.

The third group is economic risk and bid pricing strategy. According to Hanák et al., bidding strategies in public construction procurement are strongly influenced by pricing orientation, the level of competition, and the economic stability of firms [7]. In many cases, competitive pressure encourages contractors to bid low in order to increase their chances of winning, but this simultaneously raises financial risk and contract performance risk at later stages. Therefore, price fluctuations, quantity accuracy, market conditions, and bid pricing

strategies are economic factors that should be incorporated into the research model.

The fourth group is technical design risk. Dosumu and Aigbavboa showed that design errors may account for a substantial proportion of project variation costs, with major causes including poor working drawings, lack of coordination among documents, and inaccurate technical descriptions [9]. More recently, Hanák et al. further emphasized that the quality of technical specifications in tender documents directly affects project success, especially in terms of scope, time, and cost [11]. This provides strong grounds for considering technical design as a central risk factor in construction bidding.

The final group is financial risk. Dziadosz et al. argued that financial risk in construction contracts should be quantified at an early stage because it is directly associated with cash flow, implementation capability, and the economic safety of the project [8]. In the bidding context, this type of risk may be reflected in weak contractor financial capacity, financial difficulties on the part of project owners, or the use of inappropriate contract types and payment terms.

### 2.3. Research gap

The above review reveals three main research gaps. First, many studies focus on a single risk group, such as legal, design, or financial risk, whereas bidding practice often reflects the simultaneous interaction of multiple groups of factors. Second, many studies adopt the contractor's perspective, while bidding risk is also closely related to project owners, procuring entities, and consultants. Third, quantitative studies that integrate multiple factor groups in the context of a major urban area in Vietnam, especially Ho Chi Minh City, remain limited [6,7,10,11].

Based on the above review, the present study argues that bidding risk in construction investment projects should not be examined from a single-factor perspective. Rather, it should be analyzed as the combined effect of multiple interrelated groups of risks. Accordingly, this study proposes an integrated model in which documentation procedures, legal procedures, economic factors, technical design, and financial factors are hypothesized to positively affect bidding risk in the bidding process.

Based on the literature review and the identified research gaps, the paper proposes the following five research hypotheses:

- H1: Documentation procedures (HS) positively affect bidding risk in the bidding process.
- H2: Legal procedures (PL) positively affect bidding risk in the bidding process.
- H3: Economic factors (KT) positively affect bidding risk in the bidding process.
- H4: Technical design (TK) positively affects bidding risk in the bidding process.
- H5: Financial factors (TC) positively affect bidding risk in the bidding process.

Based on the proposed model and hypotheses, the next section presents the research methodology, including scale development, data collection, and analytical techniques used to test the model.

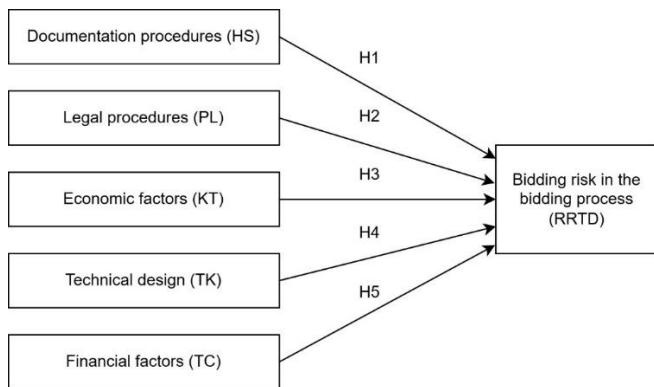


Figure 1. Proposed research model.

### 3. Research Methodology

#### 3.1. Research design

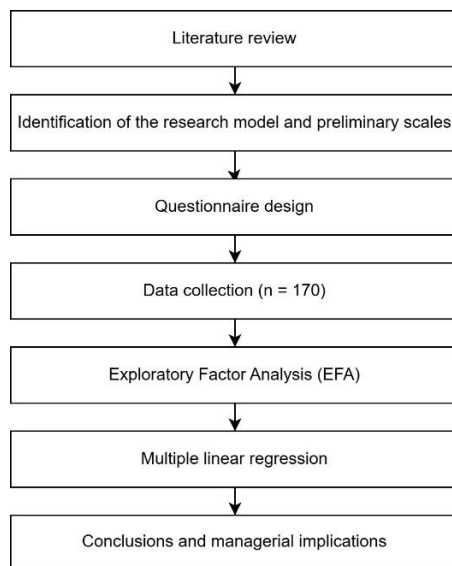


Figure 2. Research process.

This study adopts a quantitative approach based on the model proposed from the literature review. The research process consists of four stages: (i) developing the measurement scales based on the literature and the original thesis, (ii) designing the questionnaire, (iii) collecting survey data, and (iv) analyzing the data using Cronbach's Alpha, EFA, Pearson correlation, and multiple linear regression.

#### 3.2. Scale development

The initial research model comprised 22 observed variables, including 21 independent variables belonging to five factor groups and

one dependent variable reflecting overall bidding risk in the bidding process. The observed variables were measured using a five-point Likert scale, ranging from 1 ("very low impact") to 5 ("very high impact").

Based on the literature and adjustments made to fit the research context, the initial scale included 22 observed variables, comprising 21 independent variables under five factor groups and one dependent variable reflecting bidding risk in the bidding process. The "Principal references" column in Table 2 presents the key references used to develop each variable group. The specific observed variables were adapted and localized to fit the survey conditions in Ho Chi Minh City. These foundational studies cover construction risk management, tender-stage risk, bidding strategies, financial risk, design errors, and legal challenges in public construction procurement.

#### 3.3. Data collection

The respondents were individuals involved in management, technical, and bidding activities in the construction sector in Ho Chi Minh City, including technical staff, bidding staff, consultants, project managers, and contractors. The study obtained 170 valid responses, satisfying the requirements for both EFA and multiple regression analysis. Given the distribution of the sample across respondent roles and project groups, the present study focuses on overall model estimation rather than formal subgroup comparison.

#### 3.4. Data analysis methods

The data were processed using SPSS 26.0. First, Cronbach's Alpha was employed to assess the reliability of the scales. Next, EFA was used to examine the convergent and discriminant validity of the variables. Pearson correlation analysis was then conducted to assess the linear relationships between the independent and dependent variables. Finally, multiple linear regression was applied to test the proposed hypotheses.

The regression model is specified as follows:

$$RRTD = \beta_0 + \beta_1HS + \beta_2PL + \beta_3KT + \beta_4TK + \beta_5TC + \varepsilon$$

### 4. Research Results

#### 4.1. Sample characteristics

The study used 170 valid survey responses. The sample mainly consisted of respondents with university-level education, 5–10 years of work experience, working on the contractor side, and having participated primarily in Group C projects. This indicates that the data reflect quite well the bidding practices of small- and medium-scale construction projects in the study area.

Cronbach's Alpha reliability testing indicates that all scales met the required threshold, with Alpha coefficients ranging from 0.759 to 0.862. At this stage, variable KT5 was removed because its corrected item-total correlation did not meet the required threshold. After excluding this variable, the remaining scales were retained for EFA.

#### 4.2. Exploratory Factor Analysis

The EFA results indicate that the data are suitable for factor analysis. The KMO coefficient is 0.735, which is greater than 0.5, indicating adequate sampling suitability for EFA. Bartlett's Test of Sphericity yielded Approx. Chi-Square = 1189.308,  $df = 171$ , and Sig. = 0.000, indicating that the observed variables are sufficiently correlated to permit factor extraction. The EFA results show that five factors were extracted, with 19 observed variables retained after screening. The cumulative variance explained reached 64.983 %, indicating that the five factors account for 64.983 % of the variation in the dataset, which is acceptable in construction management research.

#### 4.3. Multiple regression results and hypothesis testing

Pearson correlation results show that all five independent factor groups are positively correlated with the dependent variable, bidding risk in the bidding process, and all correlations are statistically significant at the 5 % level. Among them, technical design has the strongest correlation with bidding risk ( $r = 0.595$ ), followed by documentation procedures ( $r = 0.520$ ), economic factors ( $r = 0.364$ ), legal procedures ( $r = 0.351$ ), and financial factors ( $r = 0.253$ ). These results provide a basis for testing the multiple linear regression model.

The regression results show that the model fits the survey data quite well. The multiple correlation coefficient is  $R = 0.712$ ; the coefficient of determination is  $R^2 = 0.507$ ; and the adjusted  $R^2$  is 0.492. Thus, the model explains 50.7 % of the variance in bidding risk. The Durbin-Watson statistic is 1.798, indicating no serious autocorrelation problem. ANOVA results show  $F = 33.754$  with Sig. = 0.000, confirming that the regression model is statistically significant.

The regression results further show that all five research hypotheses are supported because the regression coefficients are positive and statistically significant at the 5 % level.

The standardized regression equation is as follows:

$$RRTD = 0.272HS + 0.132PL + 0.134KT + 0.405TK + 0.118TC$$

The results indicate that the effects of the factor groups on bidding risk decrease in the following order:

Technical design → Documentation procedures → Economic factors → Legal procedures → Financial factors

## 5. Discussion

The findings indicate that bidding risk in construction investment projects is the combined result of multiple groups of factors rather than a single isolated cause. All five factor groups, namely documentation procedures, legal procedures, economic factors, technical design, and financial factors, positively and significantly affect bidding risk. This finding is consistent with the view that construction risk is multidimensional and emerges from the early stages of the project life cycle [5].

Among the tested factors, technical design exerts the strongest effect on bidding risk (Beta = 0.405). This indicates that, in actual bidding practice, the quality of design documents, the consistency among technical documents, and the clarity of technical requirements play a particularly important role. When design documents contain errors, lack information, or are inconsistent with project implementation conditions, contractors face difficulties in quantity take-off, determination of construction methods, and bid price estimation. This finding is consistent with Dosumu and Aigbavboa, who showed that design errors are a major cause of variation costs in construction projects [9]. It is also consistent with Hanák, Mikulík, and Soniewicki, who emphasized that the quality of technical specifications in tender documents directly affects project success [11].

This strong effect may also be explained by local practice in Ho Chi Minh City. In many construction packages, especially smaller and medium-sized projects, the bidding stage is often conducted under tight time constraints and strong pressure to move quickly into implementation. Under such conditions, inconsistencies between design drawings, technical specifications, and quantities can immediately affect quantity take-off, cost estimation, and bid preparation. As a result, technical design risk becomes more immediate and operationally visible to bidders than other categories of risk at the bidding stage.

Documentation procedures constitute the second strongest factor group (Beta = 0.272). This accurately reflects the reality of construction bidding in Vietnam, where the quality of tender documents, the clarity of evaluation criteria, the time allocated for bid preparation, and the competence of bidding staff can directly affect contractor selection outcomes. If tender documents are unclear or if the procuring entity responds slowly during the clarification process, the resulting risk is not limited to bid disqualification but also includes the possibility of inaccurate pricing and misunderstanding of package requirements. This finding is consistent with Pham et al., whose study of the tendering stage in design-build projects in Vietnam showed that risks related to documents, contracts, and project information directly affect contractors' bidding decisions [6]. It is also in line with Hanák et al., who highlighted the roles of package conditions, competition, and document preparation capability in bidding strategies [7].

Regarding the economic factor group (Beta = 0.134), the results indicate that such factors as bid prices, fluctuations in material prices, market-based unit prices, and the accuracy of quantities in tender documents significantly affect bidding risk. This is reasonable because in a competitive bidding environment, bid pricing strategy always reflects a balance between the probability of winning and economic efficiency. An excessively low bid price may increase the probability of winning in the short term but also raises financial risk and contract performance risk at later stages. This finding is consistent with Hanák et al., who argued that bidding strategies in public construction procurement are strongly influenced by competitive conditions and the need to maintain firms' economic stability [7].

The legal procedures factor group (Beta = 0.132) also positively affects bidding risk. Although its effect is smaller than that of documentation and technical design, this result indicates that changes in regulations, policies, norms, unit prices, or the interpretation and application of legal provisions remain a considerable source of risk. In practice, even slight differences in legal interpretation may lead to complaints, prolong bid evaluation, or delay contractor selection. This finding is consistent with Mitchell and Agapiou, who showed that legal challenges in public construction procurement may increase uncertainty and delay the contractor selection process [10].

The financial factor group has the lowest coefficient but remains statistically significant (Beta = 0.118). This indicates that contractors' financial capacity, project owners' financial difficulties, as well as contract and payment conditions, still affect the degree of risk at the bidding stage. However, in this study, respondents tended to perceive

risks that are immediately visible in documents and technical materials as more urgent than financial risks. This finding is consistent with Dziadosz et al., who argued that financial risk should be quantified and controlled early because it is directly associated with cash flow, implementation capability, and project economic safety [8].

Overall, the findings suggest that controlling bidding risk should begin with improving the quality of design documents and tender documents, followed by measures related to pricing, legal compliance, and financial control. This order of priority has important practical implications because it helps the parties involved in bidding allocate risk management resources more effectively, avoid dispersion, and focus on the most influential factor groups. The study also adds empirical evidence in support of an early-stage risk management approach in construction investment projects [5, 6].

**Table 1.** Literature synthesis and research gaps.

Factor group	Evidence from previous studies	Research gap
Documentation procedures (HS)	Document quality, competitive conditions, and document preparation capability affect bidding decisions [6], [7]	Not yet tested integratively with other risk groups in the context of Ho Chi Minh City
Legal procedures (PL)	Legal challenges and complaints may delay contractor selection [10]	Few quantitative studies in Vietnam at the local level
Economic factors (KT)	Bidding strategy is influenced by competition, price, and economic efficiency [7]	Need to quantify relative impacts within a single model
Technical design (TK)	Design errors and technical specification quality strongly affect project performance [9], [11]	Need to test the level of impact at the bidding stage in the Vietnamese context
Financial factors (TC)	Financial risk should be identified early in construction contracts [8]	Not yet compared simultaneously with documentation, legal, economic, and technical factors

**Table 2.** Initial measurement scales and principal references.

Factor group	Code	Observed variable	Principal references
Documentation procedures (HS)	HS1	Lack of standardization in the operation of bidding organizations	[6], [7]
	HS2	Delayed response from the procuring entity when clarification is requested	[6], [7]
	HS3	Bid preparation time is too short	[6], [7]
	HS4	Lack of experience or competence among bidding specialists	[6], [7]
	HS5	Tender documents contain many deficiencies and are unclear	[6], [7], [11]
	HS6	The consulting unit has not provided sufficient advice on the bidding process	[6], [7]
Legal procedures (PL)	PL1	Changes in State economic policies	[1], [2], [10]
	PL2	Unclear allocation of responsibilities among joint-venture contractors in bid preparation	[1], [2], [10]
	PL3	Changes in State regulations (construction norms, unit prices, settlement procedures, inspection, auditing, etc.)	[1], [2], [3], [4], [10]
	PL4	Corruption and leakage of sensitive information during the bidding process	[1], [2], [10]
Economic factors (KT)	KT1	Bid prices are too low	[7], [8]
	KT2	Quantities in tender documents are inaccurate	[6], [7], [11]
	KT3	Cost estimates are based on unit prices inconsistent with market prices	[7], [8]
	KT4	Market fluctuations in material and labor prices	[7], [8]

Factor group	Code	Observed variable	Principal references
	KT5	Advance payment and settlement conditions are inconsistent with the contractor's financial capacity	[8], [10]
Technical design (TK)	TK1	Design documents do not take future planning into account	[5], [9], [11]
	TK2	Design errors create difficulties for bidders	[5], [6], [9], [11]
	TK3	Level of technical competition with other contractors	[6], [7], [11]
Financial factors (TC)	TC1	The contractor's financial capacity to execute the package is weak	[6], [8]
	TC2	The project owner itself faces financial difficulties	[8], [10]
	TC3	Inappropriate contract type selection or weak contractual constraints	[6], [8], [10]
Dependent variable	RRTD	Overall level of risk in the bidding process of construction investment projects	[5], [6], [7]

**Table 3.** Sample characteristics.

Criterion	Category	Frequency	Percentage (%)
Education level	Below university	24	14.1
	University	97	57.1
	Postgraduate	49	28.8
Work experience	Below 5 years	23	13.5
	5 to 10 years	111	65.3
	Above 10 years	36	21.2
Project role	Project owner	41	24.1
	Consultant	53	31.2
	Contractor	76	44.7
Project group participated in	Group A	2	1.2
	Group B	27	15.9
	Group C	141	82.9

**Table 4.** EFA results.

Factor	Observed variable	Observed variable content	Factor loading	% Variance explained	Cumulative %
Factor 1: Documentation procedures (HS)	HS4	Lack of experience or competence among bidding specialists	0.791	20.941	20.941
	HS2	Delayed response from the procuring entity when clarification is requested	0.764		
	HS3	Bid preparation time is too short	0.763		
	HS5	Tender documents contain many deficiencies and are unclear	0.750		
	HS1	Lack of standardization in the operation of bidding organizations	0.747		
Factor 2: Legal procedures (PL)	PL1	Changes in State economic policies	0.858	13.548	34.489
	PL3	Changes in State regulations	0.856		
	PL4	Corruption and leakage of sensitive information during the bidding process	0.838		
	PL2	Unclear allocation of responsibilities among joint-venture contractors in bid preparation	0.771		
Factor 3: Economic factors (KT)	KT2	Quantities in tender documents are inaccurate	0.782	11.660	46.149
	KT1	Bid prices are too low	0.760		
	KT4	Market fluctuations in material and labor prices	0.752		

Factor	Observed variable	Observed variable content	Factor loading	% Variance explained	Cumulative %
	KT3	Cost estimates are based on unit prices inconsistent with market prices	0.731		
Factor 4: Financial factors (TC)	TC1	The contractor's financial capacity to execute the package is weak	0.850	10.478	56.627
	TC2	The project owner itself faces financial difficulties	0.828		
	TC3	Inappropriate contract type selection or weak contractual constraints	0.819		
Factor 5: Technical design (TK)	TK3	Level of technical competition with other contractors	0.877	8.356	64.983
	TK1	Design documents do not take future planning into account	0.837		
	TK2	Design errors create difficulties for bidders	0.761		

**Table 5.** Regression results and hypothesis testing.

Factor	B	Standardized Beta	t	Sig.	Conclusion
Documentation procedures (HS)	0.215	0.272	4.336	0.000	H1 supported
Legal procedures (PL)	0.084	0.132	2.229	0.027	H2 supported
Economic factors (KT)	0.134	0.134	2.265	0.025	H3 supported
Technical design (TK)	0.331	0.405	6.602	0.000	H4 supported
Financial factors (TC)	0.113	0.118	2.092	0.038	H5 supported

**Table 6.** Comparison of the results of this study with previous studies.

Topic	Result of this study	Related studies	Comment
Technical design is the strongest factor	Beta = 0.405	Dosumu and Aigbavboa (2017); Hanák, Mikulík, and Soniewicki (2025)	Consistent with the argument that design errors and the quality of technical requirements increase risk from the bidding stage
Documentation procedures have a strong effect	Beta = 0.272	Pham et al. (2021); Hanák et al. (2021)	Reinforces the role of tender document quality and bid preparation capability
Economic factors have a positive effect	Beta = 0.134	Hanák et al. (2021)	Consistent with the role of bid pricing strategy and market fluctuations
Legal factors are statistically significant	Beta = 0.132	Mitchell and Agapiou (2023)	Confirms that legal compliance is a substantive source of risk in construction bidding
Financial factors matter but less than the others	Beta = 0.118	Dziodosz et al. (2015)	Suggests that finance is a background risk, but practitioners perceive documentation and technical risks more clearly at the bidding stage

## 6. Conclusion

This study was conducted to identify and measure the risk factors affecting the bidding process of construction investment projects in Ho Chi Minh City. Based on a survey of 170 respondents involved in management, technical, and bidding activities in the construction sector, the study employed Cronbach's Alpha, EFA, Pearson correlation, and multiple linear regression to test the research model.

The findings show that the model includes five statistically significant groups of factors affecting bidding risk, namely documentation procedures, legal procedures, economic factors, technical design, and financial factors. After scale refinement, the final model retained 19 observed variables and explained 50.7 % of the

variance in bidding risk. The order of effects is: technical design, documentation procedures, economic factors, legal procedures, and financial factors.

These findings indicate that bidding risk does not arise solely from the external environment but also stems strongly from the quality of project inputs, particularly design documents and tender documents. This is a practically significant finding for project owners, procuring entities, and contractors.

Based on the results, the paper proposes several managerial implications. First, the quality of design documents and technical requirements should be improved before issuing tender documents. Second, the quality of tender documents and bid dossiers should be standardized and more strictly controlled. Third, the participating

parties should be more proactive in forecasting economic fluctuations and controlling bid pricing strategies. Fourth, the capacity to update and comply with legal requirements throughout the bidding process should be strengthened. Fifth, the financial capacity of participating parties should be assessed more substantively.

This study has several limitations. The survey sample was collected only in Ho Chi Minh City and was heavily concentrated on Group C projects, with a relatively larger proportion of contractor-side respondents. Therefore, the findings should be interpreted primarily in relation to smaller construction projects and the perspectives represented in the sample. In addition, the model explains 50.7 % of the variance in bidding risk, indicating that other factors have not yet been considered. No formal subgroup analysis by respondent role was conducted, as the unequal subgroup sizes would not provide sufficiently robust comparative estimates. Future research may expand the survey scope, compare different project types, or employ a more balanced sample to conduct subgroup analysis across project owners, consultants, and contractors, as well as apply SEM techniques to test the model more rigorously.

success. *International Journal of Managing Projects in Business*. 2025;18(8):79–99. DOI: 10.1108/IJMPB-12-2024-0325.

## References

- [1]. National Assembly. Law on Bidding No. 22/2023/QH15. Issued June 23, 2023; effective January 1, 2024.
- [2]. Government. Decree No. 214/2025/ND-CP detailing a number of articles and measures for implementation of the Law on Bidding regarding contractor selection. Issued August 4, 2025.
- [3]. National Assembly. Law on Construction No. 50/2014/QH13. Issued June 18, 2014; effective January 1, 2015.
- [4]. National Assembly. Law No. 62/2020/QH14 amending and supplementing a number of articles of the Law on Construction. Issued June 17, 2020; effective January 1, 2021.
- [5]. Edwards PJ, Bowen PA. Risk and risk management in construction: a review and future directions for research. *Engineering, Construction and Architectural Management*. 1998;5(4):339–349. DOI: 10.1046/j.1365-232X.1998.54072.x.
- [6]. Pham D-H, Ly D-H, Tran N-K, Ahn Y-H, Jang H. Developing a risk management process for general contractors in the bidding stage for design-build projects in Vietnam. *Buildings*. 2021;11(11):542. DOI: 10.3390/buildings11110542.
- [7]. Hanák T, Drozdová A, Marović I. Bidding strategy in construction public procurement: a contractor's perspective. *Buildings*. 2021;11(2):47. DOI: 10.3390/buildings11020047.
- [8]. Dziadosz A, Tomczyk A, Kapliński O. Financial risk estimation in construction contracts. *Procedia Engineering*. 2015;122:120–128. DOI: 10.1016/j.proeng.2015.10.015.
- [9]. Dosumu OS, Aigbavboa CO. Impact of design errors on variation cost of selected building project in Nigeria. *Procedia Engineering*. 2017;196:847–856. DOI: 10.1016/j.proeng.2017.08.016.
- [10]. Mitchell M, Agapiou A. Legal challenges and public procurement in construction in Northern Ireland. *Buildings*. 2023;13(3):773. DOI: 10.3390/buildings13030773.
- [11]. Hanák T, Mikulík M, Soniewicki M. Impact of the quality of technical specifications of the tender documentation on the construction projects'