FACTORS AFFECTING BID/NO-BID DECISION OF CONSTRUCTION PROJECTS IN VIETNAM

Le Anh Van[1,*], Nguyen Dang Thanh[2]

[2]*Lecturer, Thu Dau Mot University, Binh Duong, Vietnam*

[*]For correspondence; Tel. + (84) 906567239, E-mail: leanhvan.hcmc@gmail.com

ABSTRACT: *The identification of factors affecting the bidding decision of the contractor is very essential. It ensures that there is a solid scientific basis for decision making "bid/no-bid". Results of the study found 40 items affecting to Bid/no-bid decision and grouped into six represented factors. According to influence degree, these factors are sorted from high to low, in absolute value, as follows: Hazard/trouble of the overall situation, Other characteristics of contractor, Bidding situation, Financial characteristics of contractor, Project characteristics and Bidding document.*

Analysis of KMO and Bartlett's Test showed that KMO value by 0.887 is satisfactory of requests and Bartlett's Test, the observed variables are correlated with each other in the general environment. The value of adjusted R2 indicates that the model can explain 39.6 percent, satisfactory for the overall relevance of above six factors with bid/no-bid decision.

Keywords: bid/no-bid, decision making, construction projects

1. INTRODUCTION

Vietnam knew as developing country, with a country with over 90 million people and with more than 60 percent under the age of 35, huge demand in construction. The country's construction industry is expected to expand in real terms over the forecast period (2017–2021), due to investments in transport infrastructure, energy and utilities and affordable housing projects. Additionally, government investment in public infrastructure and educational healthcare buildings as part of the 2016–2020 Development Plan will support this growth [1]. The construction contractor will have more options to participate in bidding and also a higher winning chance. Currently, in Vietnam, the bid/no-bid decision makers do not understand clearly basing on where to make the decision, based solely on intuition derived from sensation, experience, and speculation. Therefore, the identification of factors affecting the bidding decision as well as the development a computerized model to support a suited decision for contractors is very essential. It ensures that there is a solid scientific basis for decision making "bid/no-bid".

Based on research by Ahmad [2], Abdul-Hadi [3], Bageis & Fortune [4] and various studies mentioned above, combined with the actual situation in Vietnam the author proposes six factors which may affect bid/no-bid decision of Vietnamese construction contractors are Financial characteristics of the contractor, Bidding situation, Hazard/trouble of the overall situation, Project characteristics, Bidding document, Other characteristics of contractor. These dimensions (factors) are expected to represent for six group of items: Factor FC - Financial characteristics of contractor, factor BS - Bidding situation, factor HS - Hazard/trouble of the overall situation, factor PC - Project characteristics, factor BD - Bidding document, and factor OC - Other characteristics of contractor.

2. REVIEW OF THE LITERATURE FOR FACTORS AFFECTING BIDDING DECISION

The first factor is financial characteristics of the contractor. Financial field of the company is one of the most important issues determining the existence and development of that company. In the bidding, "financial characteristics of the contractor" is subjective factors of contractors to decide whether to bid or not to bid. It is representative of group of four items: Financial availability for project refers to the financial resource of the contractor to implement the project after winning the tender [2-3]; Certainty in cost estimate refers to the level of accuracy in the calculation; Cost estimate of the project which contractor intends to participate in bidding [2-4]; Profit of similar projects already done refers to attractive level of profit from new project comparing with completed similar projects [2-4]; Contingency capital is a provision expense of the contractor to remedy the risks that may occur during implementation of the project after winning the tender [2-3].

The second factor is bidding situation. This includes both subjective and objective factor of a contractor. It is representative of group of six items: Suitability of bond capacity refers that value of bid guarantee required by investor in bidding documents is consistent with finance of contractor or not [2-4]; Time allowed for submitting bids is the time required for the preparation of all documents of contractors to participate in bidding [2-4]; Bidding document price is the cost that contractor have to spend for buying a set of bidding documents [3-4]; Invitation or public refers to bidding types, it is limited or unlimited the number of contractors [2-4]; Prequalification requirements of bids is the investor's requirements for contractor to consider in the first step before formal bidding invitation; Time of bidding (season) is the time of bidding held during year [3-4].

The third factor is hazard/trouble of the overall situation. This is an almost purely objective factor to the contractor. Contractor itself can only partially overcome the passive through forecasting, adjusting its business strategy to suit the actual situation. It is representative of the group of five items: Fluctuation of the overall economy is external agents which impact to the contractor. Fluctuation of economy is including a region, a nation, and the world...; Risk involved in investment refers to all of the risks that may occur to the stakeholders in the implementation process [3-4]; Lack of stability of governmental policies refers to frequent adjustments in the operating policies of the Government [2-4]; Competition refers to level of competition between contractors in the market at the time of bidding preparation [2,3]; Risks expected fluctuation of labour force refers to scarcity of manpower for contractor unexpectedly during implementation of project after winning the tender [3-4].

The fourth factor is project characteristics. This is a factor including related items to main issues of the project that is put out tender. It is representative of group of 10 items: Financial ability of owner refers to ability of owner in the complete and timely payment for contractors, suppliers during the project implementation [2-4]; Size of the project appropriate with contractor is the ability of manpower, equipment, finance, experience ... of contractors which able to meet the requirements appropriate to the size of project; Required project progress appropriately refers to implementation capacity of contractor can meet the required progress of the project or not; Project location is the location of building site where the contractor will carry out. This location has many advantages to contractor or not [2-4]; Project cash flow refers to cash flow during project implementation which is consistent with the financial capability of contractor or not [3-4]; Availability of required equipment refers to ability of contractor to supply required machines, required equipment's... of the project [2-4]; Job start time is the expected time to commence carrying out project. This start time is advantageous to the contractor or not [3-4]; Special requirements of owner refers to ability of contractors to meet of some special requirements of owner as equipment, capabilities, experience, reputation ... which are stated in the tender documents [2-4]; Accessibility of building site refers to real access conditions of contractor at building site in traffic, transportation of materials and equipment, logistics... [4]; Availability of qualified human resource refers to ability of contractors to provide timely qualified human resources to service the project [2-4].

The fifth factor is bidding document. This refers to issues related to project documents. It is representative of the group of three items: Type and term of a contract is a very important matter for owner and contractors. There are contract types like turnkey contract, package deal contract, fixed-price contract, design & build contract... And the terms of contract define binding regulations, responsibilities, rights, and obligations... of the concerned parties; Design quality refers to the influence of the design quality strongly to the efficiency of the project implementation process. A good design will bring better efficiency for both owner and contractors [2-4]; Designer's reputation is quite important for a project because commonly a good designer will make a good design product [3-4].

The sixth factor is characteristics of a contractor. This is representative of group of seven items: Need for work refers to necessary level of contractor needing more projects [3-4]; Experience in similar projects refers that if a contractor had done similar projects, he has a lot of experience while participating in bidding [3]; Confidence in workforce refers to confidence in the workforce of contractor to implement project after winning the tender; Strength of contractor refers that strong points of contractor can create advantages when he implements project after winning the tender [2-3]; Current workload refers that the current workload corresponds with capacity of contractor or not; Relationship with owner is very important for the possibility of winning. Owner will favor to selecting the contractor who has a good relationship with him; Reliability of subcontractors refers to the confidence of the main contractor into the ability of subcontractors to implement the project. In any construction project, there are also subcontractors working under management and operating of main contractor [3-4].

All six factors listed as the above are expected affecting bid/no-bid decision making of contractors in Vietnam. To confirm this matter correctly as well as the level of influence of these factors, the author has performed research and evaluation them. The result of the study will be presented. The signification of this study is the determination about mentioned above factors that may affect bid/no-bid decision of the construction contractors in Vietnam.

3. THEORETICAL FRAMEWORK

Rely on the research process of Tho, Trang [5], the author proposes flow of research presented in figure below including statement of the problem, conducting preliminary study, official study (data gathering), treatment of data gathering.

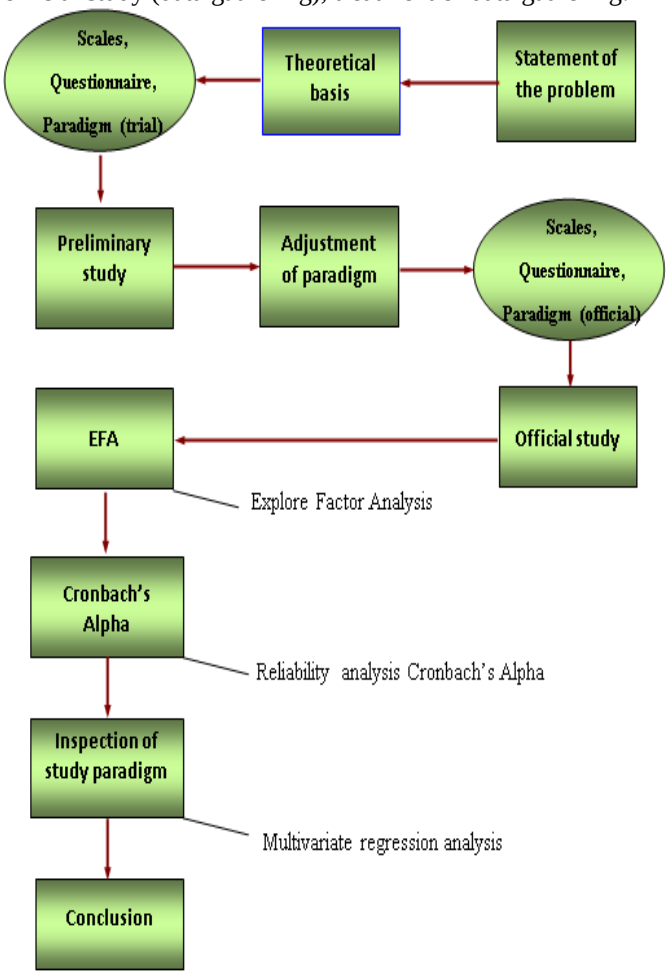

Fig (1) Flow of Research

The research was conducted with the theoretical framework expressed in figure below. There are six item groups (six factors/dimensions) which are representative for 35 items (35 independent variables-X) including: FC - Financial characteristics of contractor is the factor represents group of four independent variables X1, X2, X3, X4; BS - Bidding situation is the factor represents group of six independent variables X5, X6, X7, X8, X9, X10); HS - Hazard/trouble of the overall situation is the factor represents group of five

independent variables X11, X12, X13, X14, X15; PC - Project characteristics is the factor represents group of 10 independent variables- X16, X17, X18, X19, X20, X21, X22, X23, X24, X25; BD - Bidding document is the factor represents group of three independent variables X26, X27, X28; OC – Other Characteristics of contractor is the factor represents group of seven independent variables- X29, X30, X31, X32, X33, X34, X35. These factors affecting bid/no-bid decision (dependent variable-Y) as figure below.

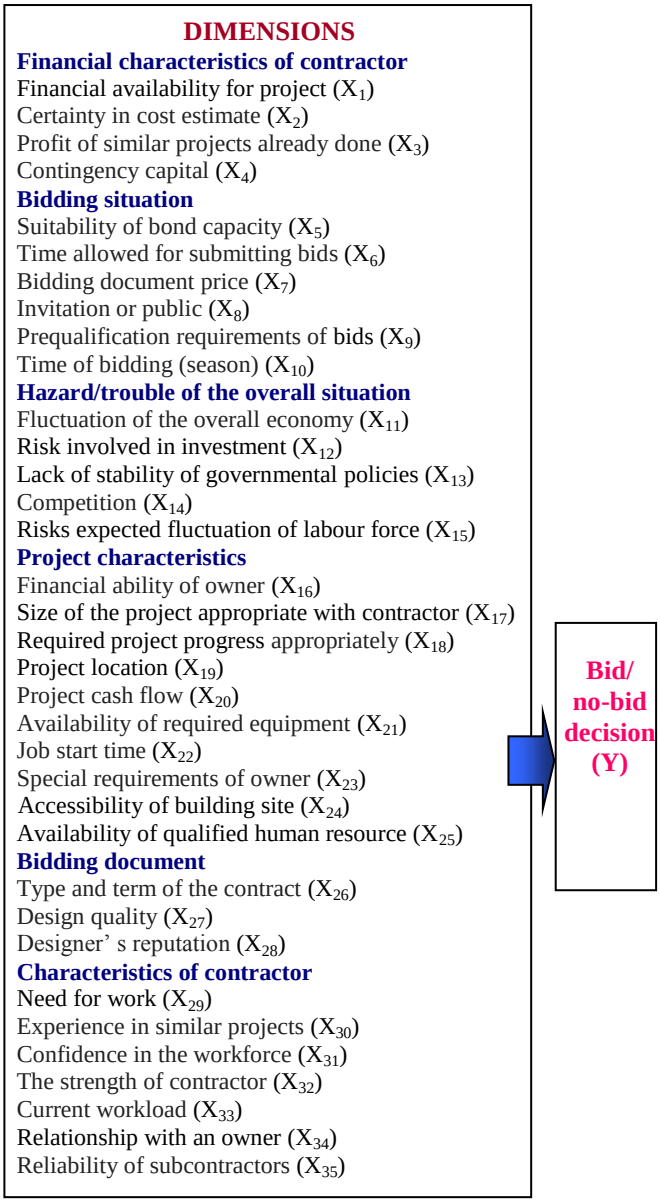

Fig (2) Theoretical Framework

4. HYPOTHESES

Quantitative variables in the study include a dependent variable which is bid/no-bid decision and 40 independent variables. Specifically, these independent variables are component items of six representative factors of 40 affecting items, the research is proposed six hypotheses:

H1: Financial characteristics of contractor more suitable for bidder leads to participation ability in the bid higher (covariates: "+").
H2: Bidding situation more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").
H3: Hazard/trouble of the overall situation fluctuates more leading to the participation ability in the bid lower (inverse relationship: "-").
H4: Project characteristics more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").
H5: Bidding document more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").
H6: Other characteristics of contractor more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").

5. RESULTS AND DISCUSSION

The number of questionnaires was sent to respondents by meeting directly or send email to suggest an answer to the questionnaire was 458, and 336 questionnaires are received (73%), with 300 valid ones (66%).

Table (1) The sample size of study

	Survey area	The number of emitted samples	The number of obtained samples	The number of valid samples	Percentage (%)
1	HCM City	150	111	105	35.0
2	Hanoi Capital	100	66	60	20.0
3	Da Nang City	50	31	28	9.3
4	Binh Duong Province	50	46	32	10.7
5	Dong Nai Province	50	44	41	13.7
6	Can Tho City	30	24	22	7.3
7	Hai Phong City	28	14	12	4.0
	Total	458	336	300	100
		100%	73%	66%	

The position of respondent reflects a part of their management experience and plays an important role in the statistical result of collected data. Type of works includes kinds of Industrial works, Civil works, Traffic works, Irrigational works, Infrastructure works.

Table (2) Position of respondents

	Position	Frequency	Percentage	Cumulative
1	Board of Directors	32	10.7	10.7
2	Chief/Deputy of Project department	61	20.3	31.0
3	Chief/Deputy of Bidding department	64	21.3	52.3
4	Commander of Building site	49	16.3	68.6

5	Employee of Bidding department	94	31.4	100.0
	Total	300	100.0	

Table (3) Type of works

	Type of works	Frequency	Percentage	Cumulative
1	Industrial works	81	27.0	27.0
2	Civil works	141	47.0	74.0
3	Traffic works	36	12.0	86.0
4	Irrigational works	8	2.7	88.7
5	Infrastructure works	34	11.3	100.0
	Total	300	100.0	

(Source: Data from survey)

Analysis of Cronbach's Alpha reliability: According to results of reliability analysis shown in the table (4), only the factor BS has relatively low reliability with Cronbach's alpha value 0.56. Remaining five factors have Cronbach's alpha value from 0.77 to 0.93. According to Tho and Trang [5], these results demonstrate the reliability of Likert scale used in the study.

Table (4) Result of reliability analysis

Factor (variable group)	Cronbach's Alpha
Factor FC - Financial characteristics of contractor	.766
Factor BS - Bidding situation	.564
Factor HS - Hazard/trouble of the overall situation	.808
Factor PC - Project characteristics	.840
Factor BD - Bidding document	.834
Factor OC - Other characteristics of contractor	.931

Analysis of exploring factor is a technique of the statistical analysis used to reduce a set of interdependent observed variables to constitute a set of variables (factor) fewer, to make them more meaningful but this set still contains most of the information content of original variable set.

Initial research model has 40 independent quantitative variables expected to impact on the dependent variable (bid/no-bid decision of contractor). With results of explore factor analysis, according to Hair et al [6], the observed variables are excluded if their weight is less than 0.5. Result of factor analysis shows that there are no variables excluded and 40 independent variables are gathered into 6 groups (representative factor). Then perform rotation matrix transformations (rotated component matrix) and constitute 6 groups like the original model. Specifically included: Factor FC is Financial characteristics of the contractor, Factor BS is Bidding situation, Factor HS is Hazard/trouble of the overall situation, Factor PC is Project characteristics, Factor BD is Bidding document and Factor OC is Other characteristics of the contractor.

Table (5) Results of synthetic explore factor analysis

Factor	FC	BS	HS	PC	BD	OC
Eigenvalues	19.483	4.110	3.436	2.279	1.019	.923
Variance explained (%)	55.665	11.744	9.816	6.512	2.913	2.636
Cumulative variance explained (%)	55.665	67.409	77.225	83.738	86.650	89.287

Cumulative variance explained is 89.29% indicating that gathered data correspond to the required standards. This result shows six above factors explaining 89.29% variance of the observed variables. Results synthetic explore factor analysis are shown in the table (5).

In Bartlett's Test, results show that KMO value by 0.887 is satisfactory of the request and Bartlett's Test having statistical signification (Sig <0.05). So the observed variables are correlated with each other in the general environment.

To test hypotheses about the relationship between the above six factors Financial characteristics of contractor, Bidding situation, Hazard/trouble of the overall situation, Project characteristics, Bidding document and Other characteristics of the contractor with the dependent variable (bid/no-bid decision), the technique of multivariate regression analysis are used. The first is the need to consider the relationship between the representative factors mentioned above. The result of Pearson correlation matrix shows no significant correlation between them. This result proves that there is no multicollinearity problem appeared in the study.

The result of regression analysis of the study model is abstracted at Table (6). The value of adjusted R2 indicates that the model can explain 39.6% > 30%, it is satisfactory for the overall relevance of above six factors with the dependent variable (bid/no-bid decision).

Table (6) Result of multivariate regressive analysis

Factor	Regressive Coefficient
FS - Financial characteristics of contractor	.111
BS - Bidding situation	.140
HS - Hazard/trouble of the overall situation	-.154
PC - Project characteristics	.109
BD - Bidding document	.078
OC - Other characteristics of contractor	.144
Constant	.640
F-value	33.651
R^2-value	.408
Adjusted R^2-value	.396

The result of regression model of bid/no-bid decision (Y)

Y = 0.640 + 0.111*FC + 0.140*BS - 0.154*HS + 0.109*PC + 0.078*BD + 0.144*OC

The regression coefficients in the model also show the partial impact of the above factors to the dependent variable. In detail, in terms of other factors do not change if Financial characteristics of the contractor are better 1 unit, bid/no-bid decision increases 11.1% (covariates). Similarly, if Bidding situation is better 1 unit, bid/no-bid decision increases 14.0%; if Project characteristics is better 1 unit, bid/no-bid decision increases 10.9%; if Bidding document is better 1 unit, bid/no-bid decision increases 7.8%; if Other characteristics of contractor is better 1 unit, bid/no-bid decision increases 14.4%. Particularly, if Hazard/trouble of the overall situation increases 1 unit, bid/no-bid decision decreases 15.4% (inverse relationship).

Also from an output of regression analysis of the collected data indicating six initial hypotheses proposed are consistent with the actual research. All five factors (Financial characteristics of the contractor, Bidding situation, Project characteristics, Bidding document and Other characteristics of contractor) relate covariantly with bid/no-bid decisions, except the factor Hazard/trouble of the overall situation relates inversely. That means these hypotheses (from H1 to H6) of study model are supported.

Table (7) Testing result of statistical hypotheses

Hypothesis	Description of hypothesis	Testing results of hypothesis
1	*Financial characteristics of contractor* more suitable for bidder leads to participation ability in the bid higher (covariates: "+")	Support
2	*Bidding situation* more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").	Support
3	*Hazard/trouble of the overall situation* fluctuates more leading to the participation ability in the bid lower (inverse relationship: "-").	Support
4	*Project characteristics* more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").	Support
5	*Bidding document* more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").	Support
6	*Other characteristics of contractor* more suitable for bidder leads to the participation ability in the bid higher (covariates: "+").	Support

6. CONCLUSION

Results of regression analysis from gathering data of the author showed that the influence level of six factors to bid/no-bid decision. They are sorted from high to low as follows: (1) Hazard/trouble of the overall situation, (2) Characteristics of contractor, (3) Bidding situation, (4) Financial characteristics of the contractor, (5) Project characteristics and (6) Bidding document. However, this result will not be immutable and have a change in the influence level of these factors if larger study in different regions. This results can support developing a computerized sample model to support contractors making bid/no-bid decision, such as applying AHP method.

7. REFERENCE

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*For correspondence; Tel. + (84) 906567239, E-mail: leanhvan.hcmc@gmail.com