

Impact of Design Company Financial Stability on Competitiveness on Regional Market

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Abstract — Business entities, including design companies, see their operations increasingly complicated in today's economic environment. Competitiveness of an enterprise is demonstrated by its higher opportunities for successful functioning as compared with other carrying out similar activities. Financial stability is a component of competitiveness assessment and the key to company's financial and economic efficiency. Therefore, this article considers how the new approach to assessing financial stability of design companies can be implemented. The assessment method suggested here differs from existing methods in taking into account the specific activities of design companies, namely, the research & development, engineering design, field supervision, revamp and retrofitting of industrial facilities and infrastructures, upgrade of existing facilities. Relevance of the problem and absence of a comprehensive solution thereto encouraged us to study financial stability of design companies as the main factor affecting a business' ability to successfully compete in the market of architectural and engineering design services for industrial and civil applications. The study is to develop a methodology for comprehensive assessment of design company financial stability taking into account the specifics of engineering design work, and to build a ranking system demonstrating a company's ability to adapt to the varying challenges of external business environment while suffering minimum losses. The study uses the methods of economic & mathematical analysis, statistical analysis and process modeling. In the course of the study, the financial stability coefficients, both existing and newly proposed by the authors, have been analyzed, and their values optimized for design companies found. The optimized values have been obtained from the data of financial stability analysis of Volgograd region's design companies and also from the review of applicable regulatory documents describing the financial stability indicators. Relying on the specifics of design company activities, we have completed the financial stability assessment with a new section, 'Financial Efficiency of Design Company Processes', covering three processes, namely design management, field supervision and subcontractor management. As a result of the study, we could use the financial stability indicators base we have generated to calculate the integrated financial stability indicator of a design company taking into account the quantitative and qualitative

dynamics of operating economic entities. An effective way to monitor and evaluate the relative position in the intra-industry competition consists in rating design companies according to their degree of financial stability. This can affect the customer's choice of engineering design contractor.

Keywords — *Company competitiveness, methodology, R&D, engineering design, assessment, design activities, rating, financial stability*

I. INTRODUCTION

Design activities are the link between the research & development (hereinafter R&D) and engineering design and the material production. Per Russian Government Regulation No. 1050 dated 15 October 2016, 'On Design Activities Management by Russian Government', a design project is package of interrelated measures combined to obtain unique results in specified timeframe with limited resources [1]. Design activities can target revamp and retrofitting of industrial plants, construction of new industrial or national infrastructure facilities, upgrade of existing plants or commissioning of new buildings and structures. This is why design companies deserve special attention, and development, financial sustainability and competitiveness shall be promoted.

The study aims to develop a comprehensive methodology for design company financial stability assessment that would demonstrate a business' competitiveness by assigning it a pace in the rating of companies.

The study pursues the following tasks:

- review financial stability of design companies as exemplified by Volgograd region;
- develop main stages of the comprehensive methodology for design company financial stability assessment, such as arrange financial stability indicators according to certain criteria (financial reliability, financial mobility, financial

stability, financial security, financial performance); calculate and analyze optimized ranges of financial stability indicator values;

- calculate the integrated indicator and rate design companies according to their position in the intra-industry competition.

Key issues of the study were to quantify the optimized financial stability indicators to the maximum degree of reliability, and to expand the indicator base with relevant new indicators allowing for the engineering design specifics and accurately demonstrating the competitiveness of a design company.

Academic views and standpoints on the topic being examined evolved from review of the works by both Russian (A.Yu. Yudonov, R.A. Fatkhutdinov, G.L. Azoyev, A.V. Chelenkov, Ye.I. Mazilkina, G.G. Panichkina, N.I. Petrsovsky, I.A. Spiridonov, S.V. Barsukova) and international (A. Smith, G. Stigler, A. Marshall, G. Robinson, E. Chamberlain, J. Schumpeter, M. Porter) scientists, and the relevant scientific and business periodicals.

The need for a method to assess design company financial stability in today's business environment is caused by the fact that financial stability is definitely a prerequisite for a faster economic development in the building sector. However, the problems of design company financial stability assessment have not been covered by scientific references so far. Financial stability being a guarantee of a business' survival and sustainability, this assessment would provide a realistic view of design company competitiveness.

II. MATERIALS AND METHODS (MODEL)

The study used scientific (special) methods, such as business analysis and statistical analysis. Also applied was the comparative analysis method. Used as information source was the financial statements database of Volgograd Region's design companies (OKVED code 74.20.1, Architecture, Engineering Design for Industrial and Civil Applications):

- VolgogradNIPImorneft (No. 1);
- Volgogradnefteproyekt (No.2);
- Tyazhpromelektroproyekt R&D Institute (No.3);
- Giprosintez Design Institute of Organic Synthesis Production (No.4);
- Volgogradzhilkommunproyekt (No.5);
- Volgogradgrazhdanproyekt (No.6);
- Giprotuboprovod (No.7);
- VolgaTEK Engineering (No.8).

The integrated methodology of design company financial stability assessment suggested here has two stages:

Stage I. Systematization of financial stability indicators by five criteria. A set of economic and financial indicators has been formed for each criterion:

1. Financial reliability: debt to equity ratio, reserves-to-production ratio, investment coverage ratio.
2. Financial mobility: property mobility ratio, current assets to equity ratio.
3. Financial stability: autonomy ratio, short-term debt ratio.
4. Financial security: equity ratio, customer base expansion.
5. Financial performance:

5.1 Subcontractor management: scope of work subcontracted; completing work within the timeframe specified in the contract; quality of subcontractor deliverables; cost effectiveness of subcontractor work.

5.2 Design management: completing work within the timeframe specified in the contract; completing work by dates initially determined by internal schedules; obtaining positive conclusions from expert authorities; customer satisfaction.

5.3 Field supervision management: timely responding to customer comments; estimated cost of field supervision; contractual cost of field supervision.

There are a total of 20 indicators, 8 of them being regulatory [2; 4] and 12 of them being new, design company specific indicators suggested by the authors.

Stage II. Calculating and analyzing optimized ranges of financial stability indicator values.

Development of design company financial stability comprehensive assessment has a sequence to follow:

1. Determine key indicators for measuring reliability, financial mobility, financial stability, financial security and financial performance of a business.
2. Calculate integrated indicator of design company financial stability (from actual values of financial stability key coefficients).

The integrated indicator of design company financial stability has been calculated in the following sequence:

- calculation and analysis of financial stability indicators,
- scoring indicators of design company financial reliability (DCFR), design company financial mobility (DCFM), design company financial stability (DCFS), design company financial security (DCFSec) and design company performance (DCP).
- determining integrated indicator of design company financial stability (I_{Integr}) by the formula:

$$I_{Integr} = DCFR + DCFM + DCFS + DCFSec + DCP.$$

III. RESULTS AND DISCUSSION

Results of the study, part I

The analysis of financial stability of Volgograd Region's design companies has shown that some indicators show stable values for all businesses reviewed; however, these values may be outside the range stipulated by the company business activity review guidelines (approved by Russian Federal State Statistics Service on 28 November 2002) and by Russian Federal Bankruptcy Office's regulation No. 31-r dated 12 August 1994 (as amended on 12 September 1994) titled 'On Approval of Procedural Guidelines to Assess Financial Status of Businesses and Decide on Unsatisfactory Balance Sheet Structure' [2], which is caused by the industry-specific factors. The online service 'Expert' (www.kontur.ru/expert) stores the base of industry-specific rated values estimated on the basis of aforementioned references.

However, the proposed methodology has some indicators without legally established rated values. This is why the authors undertook to determine optimized values for these indicators through numerous calculations of coefficients applicable to design companies. Such indicators include the investment coverage ratio. Given that not a single company in Volgograd Region has succeeded in securing investment coverage ratio's rated value, below or equal to 1, over the past 5 years, the authors have introduced threshold values for this indicator. The second and no less important indicator is the property mobility ratio, the situation with which is similar, with no company showing the specified rated value of 0.1

Moreover, the authors have proposed and introduced the following new indicators: customer base expansion; scope of work subcontracted; completing work within the timeframe specified in the subcontract; quality of subcontractor deliverables; completing work within the timeframe specified in the contract; completing work by dates initially determined by internal schedules; obtaining positive conclusions from expert authorities; customer satisfaction; timely responding to customer comments; estimated cost of field supervision (hereinafter FS); contractual cost of FS; and financial performance. As for the reserves-to-production ratio, the authors believe that its increase from the previous period should be considered.

B. Results of the study, part II

As said above, there are a total of 20 assessment criteria for design company financial sustainability. The maximum score for each criterion is 5. Given this scoring option, the maximum value of the integrated indicator would be 100. The financial stability calculation results have been used to score each indicator in accordance with the author's method of determining optimized values for design company financial stability coefficients. Then the authors have ranked companies depending on the final score range. Thus, design companies can be ranked according to their financial stability as follows:

- 1) 0-49 – extremely low
- 2) 50-75 – low

3) 76-89 – medium-high

4) 90-100 – high

The ranking is based on the analysis of designer company financial stability.

Extremely low financial stability of a design company means that the company is unable to fully satisfy the creditor claims and (or) to fulfill the payment obligations (bankruptcy).

Low financial stability of a design company means that the company is unable to adequately address external and internal business challenges, and has an imbalanced structure of assets and liabilities.

Medium-high financial stability of a design company means that the company operates unstably but is capable of fulfilling its obligations. Medium-high financial stability enables the design company to respond to external challenges using minimum resources, and therefore corresponds to a business' status where its financial stability coefficients are within permissible ranges and ensure sustainable operation. Thus, the design company can actually benefit from the changing economic environment affecting it, and reduce the negative impact thereof.

High financial stability of a design company means that the design company operates stably and fulfills all its obligations. High financial stability enables the design company to promptly adapt to any changes in the economic environment. When the financial stability is high, the company's financial stability coefficients approximate their maximum values, which ensures sustainable operation of the business. At the high financial stability level, the company can successfully survive and, moreover, stably operate in the conditions of economic crisis.

To assess the players in the intra-industry competition, integrated indicators were calculated and used to make the 2013-2015 ranking of Volgograd Region's design companies. The ranking is shown in Table 1. The number of design companies with medium-high financial stability was 3 in 2013, 3 in 2014, and 3 in 2015; the number of design companies with low financial stability was 1 in 2013, 0 in 2014, and 0 in 2015; the number of design companies with high financial stability was 4 in 2013, 5 in 2014, and 5 in 2015. Thus, VolgaTEK Engineering improved its standing over the three years to rank first in 2015 instead of seventh as in 2013; Volgogradnefteproyekt, however, held the lowest positions in the rating over the entire three-year period. It is worth noting that financial stability ranking gives an idea of design companies' competitiveness and helps the customer to make an informed choice of competent contractors for their projects.

C. Results of the study, part III

Equations (formulae)

A. The financial stability section has been complemented with the customer base (hereinafter CB) expansion indicator.

CB expansion = amount under contracts of current period/amount under contracts of previous period.

B. Performance evaluation of the process 'subcontractor management', four criteria scored to a one-to-ten scale:

1. Scope of work subcontracted = scope of work subcontracted in a period/scope of work completed by the design company in the same period), %.

The expert team finds the significance weighting factor equal to 2, which is due to the fact that the top-priority criteria for a design company are the 'completing work within the timeframe specified in the contract' default on which may result in termination of contracts and loss of expected profit; and the 'quality of subcontractor deliverables' requiring extra control as no payments are normally made before the customer has accepted the deliverable documents, which makes the design company liable to both the principal customer (handover of works completed to schedule) and the subcontractor (payment of works completed). The less work is subcontracted, the better it ultimately is for the design company as sharing work means sharing finance and entails cash outflow.

2. Completing work within the timeframe specified in the contract (if subcontractors have timely completed all the contracts for a given period, the completion rate is 100%; if any backlogs occurred, then:

Total amount allocated to subcontracts - (amount for broken contracts/total amount allocated to subcontracts), %.

The expert team finds the significance weighting factor equal to 3; the figure corresponds to the indicator's significance for the design company.

3. Quality of subcontractor deliverables is determined by scoring the supplier's (subcontractor's) output. The supplier's (subcontractor's) output shall be scored by the design company's experts. The design company is to evaluate the performance of each subcontractor individually, and the average of all subcontractors will be assumed as the subcontractor deliverables quality indicator.

The expert team finds the significance weighting factor equal to 3; the figure corresponds to the indicator's significance for the design company.

4. Cost effectiveness of subcontractor work can have a positive value if, for example, a business has allocated RUB 2mn to and actually spent RUB 1.5mn for subcontracts. If subcontracted work actually exceeded the planned amount budget, the cost effectiveness is negative. If the budget spent is equal to the budget planned, the cost effectiveness is equal to 0.

C. For the process 'design management', the authors suggest the following assessment criteria:

1. Completing work within the timeframe specified in the contract. This criterion is calculated as the ratio of contracts completed timely within a given period of time to the total number of contracts for this period, and measured in %.

2. Completing work by dates initially determined by internal schedules. This criterion is calculated as the ratio of schedules completed as initially planned to the total number of schedules for a given period, and measured in %.

3. Obtaining positive conclusions from expert authorities. This criterion is calculated as the ratio of positive conclusions to overall number of conclusions for a year, and measured in %.

4. Customer satisfaction. When the work handover & acceptance report is signed for the last project stage, the design company finds out customer's satisfaction with the services by sending the customer formal requests to provide 'Customer Satisfaction Indicators' and 'Customer Opinion on Contractor's Performance.' The customer scores the designer's work to a one-to-five scale. When all customers have provided their score for a given period of time, the average of all the customers is calculated, and the value obtained is used as the customer satisfaction indicator.

D. For the process 'field supervision management', the authors suggest the following assessment criteria:

1. Timely responding to customer comments. This indicator shows the average number of days spent by the design company on responding to customer comments. The indicator is calculated as follows:

Timely responding to customer comments = sum of days on all comments/number of comments.

The significance weighting factor for this indicator is assumed as 10. The process performance is calculated and a five-year graph thereof is plotted.

2. Estimated and contractual costs of field supervision are determined with reference to 'Field Supervision Cost Evaluation Methodology for Field Supervision of Building/Facility Construction Projects Funded By the Federal Budget Of The Russian Federation' developed by Kositsky's Central Institute of Standard Design and City Planning [3].

Thus, if the subcontractor management, design management and field supervision processes are properly accounted for, the design company performance analysis will be more accurate and complete, which will further improve the quality control of completed work and thus ensure extension of current contracts. Extension of existing contracts or attraction of new customers directly determines financial stability of the company.

TABLE I. 2013-2015 VOLGOGRAD REGION'S DESIGN COMPANIES RANKING

Rank		2013		2014		2015	
			score		score		score
1		Volgogradgrazhdan-proyekt	99	Volgogradgrazhdan-proyekt »	99	VolgaTEK Engineering	99
						VolgogradNIPmorneft	98
2	High	Giprosintez	96	VolgogradNIPmorneft	97	Giprosintez	95
				VolgaTEK Engineering	97	Volgogradzhilkommun-proyekt	95
3		VolgaTEK Engineering	95	Giprosintez	96	Volgogradgrazhdan-proyekt	90
4		Giprotruboprovod	90	Giprotruboprovod	91		
						Giprotruboprovod	89
5	High-Medium	VolgogradNIPmorneft	88	Tyazhpromelektro-proyekt	79	Tyazhpromelektro-proyekt	80
				Volgogradnefte-proyekt	79		
6	Medium-High	Volgogradzhilkommunproyekt	82			Volgogradnefteproyekt	79
7		Tyazhpromelektro-proyekt	76	Volgogradzhilkommunproyekt	78		
8	Low	Volgogradnefte-proyekt	75				

IV. CONCLUSION

As a result of the study, the methodology has been developed to comprehensively assess design company financial stability, rank design companies, and make accurate judgments about their competitiveness. The methodology was tested on the example of Volgograd Region's companies based on their 2013-2015 performance figures. Integrated indicators of design company financial stability were calculated (OKVED code 74.20.1, Architecture, Engineering Design for Industrial and Civil Applications) and the design companies were ranked accordingly. Per the ranking results of Volgograd Region's design companies, six entities ranked high and two entities medium-high.

The proposed methodology increases chief executives' awareness of the financial performance and financial stability of the companies they head, and helps them make efficient managerial decisions for maintaining a competitive edge over similar industry players. Moreover, design companies ranking is an important tool for customers helping them make an informed choice of competent contractors for their projects.

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