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Assessment of the Regional Current Liquidity in the Construction Industry of the Czech Republic

Eva Vitkova[a], Lucie Vankova[a], Gabriela Kocourkova[a]*

[a]*Brno University of Technology, Faculty of Civil Engineering, Veveri 331/95, 602 00 Brno, Czech Rebublic*

Abstract

In these times, when the whole world is paralysed by the Covid-19 pandemic crisis, every company needs to maintain its ability to pay its debts. Such solvency represents one of the most important factors of financial health. The authors focused mainly on the research into current liquidity in the construction industry and whether the construction companies use external resources for their cash flows to a reasonable extent. The scientific literature sources use for this purpose the ratio of own and external resources as a 50:50 ratios, a reasonable ratio may also be 40:60 [1]. The authors of the article took into account a 5-year period related to the national statistics given by the Ministry of Industry and Trade within the construction sector [2]. However, since the sum of the national data on current liquidity and use of external resources in the construction sector can be misleading, these indicators were also monitored at the regional level. The Czech Republic has 14 regions, which vary considerably in terms performance [3]. The aim of the article is to show the regional financial situation in the construction industry in relation to the national statistics and establish a ranking of the financial performance of the regions within the construction industry using multi-criteria analysis. The research question was how much the regional statistical outputs differ from the outputs of the national statistics.

Keywords: Construction companies; Ministry of Industry and Trade; Current liquidity; Other financing resources; Region.

* Corresponding author.
E-mail address: kocourkova.g@fce.vutbr.cz

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1. Introduction

In general, liquidity is one of the most important financial ratios that can be used to measure the financial stability of entities in a given field of industry. The source of funding has a significant impact on liquidity. [4] Generally, in the literature, the ratio between own and external resources is given as 50:50 percentage. The more external resources are used for financing, the worse the liquidity could be in the future. The liquidity of the entity, i.e., whether the entity is able to repay its liabilities is very important at this point. The location of the entity certainly has an impact on the decision on the choice of entity financing. [5] It depends on whether there are enough job opportunities, enough investment opportunities, level of unemployment rate of the population in the location or what is the net disposable income of the population, or what is the average gross monthly wage level reflecting their potential purchasing power, they receive. For the reasons mentioned above, the authors of the paper focused specifically on different localities in the Czech Republic, which are specified as regions, and they examined how the current liquidity of construction companies in regions can be assessed in relation to the performance of a given region which is determined by selected macroeconomic indicators within the construction sector. A 5-year timeline, 2015-2019 was researched within the analysis.

2. Present State References

The Ministry of Industry and Trade quarterly updates the values of the financial analysis indicators, which are published for different fields according to the NACE classification. The analysis presented in this article concerns the construction sector, which is composed of three subcategories, namely building construction, civil engineering and specialized construction activities. [2] There are no other publicly available and freely accessible statistics showing the economic development of individual industrial fields in the Czech Republic. A negative feature of these statistics is the low number of input samples for a given sector, e.g., for the construction sector, there is an average of 43 samples for the 2015-2019 period (see Table 1).

Table 1. Number of samples for statistical data. [Authors´ own work according to 2]

Year	2015	2016	2017	2018	2019
No. of samples	42	40	36	49	49

There is no statistical research into this issue at the regional level. The Czech Republic is divided into 14 regions, these regions have been recorded since 1 January 2021 on the map portal of the Ministry of the Interior, namely: the Capital City of Prague, the Central Bohemian Region, the South Bohemian Region, the Plzeň Region, the Karlovy Vary Region, the Ústí ad Labem Region, the Liberec Region, the Hradec Králové Region, the Pardubice Region, the Vysočina Region, the South Moravian Region, the Olomouc Region, the Moravian-Silesian Region and, the Zlín Region [3]. Each region is composed of several administrative districts (cities), i.e., there is a different number of populations, location, demographics, job opportunities, business and investment opportunities, as well as other macroeconomic attributes that are important for the performance of the region itself. The following were selected as macroeconomic indicators that reflect the performance of the regions: gross domestic product, net disposable income, unemployment rate, and average gross monthly wage. All this data is available from the Czech Statistical Office webpage [6].

The most closely monitored indicator of macroeconomic performance seems to be a gross domestic product (GDP). Another frequently followed macroeconomic indicator at the regional level is the unemployment rate. Its level is largely dependent on the development of GDP; however, it is also influenced by other factors such as total employment rate, the age and educational structure of the population, the state of transport infrastructure, etc. [7]. In addition, the most frequently monitored indicators include those related to the standard of living of the population - average wages and disposable income of a household. [8].

The financial rule is the risk equalization rule [1] which states that the ratio of own and external resources should be 1:1, over time the ratio has changed to 1:2, and also to 1:3.

Biliavska, Mizunska and Kovalchuk [9] assessed the liquidity of two companies and the basic problems of the unstable financial condition of the companies determined with the help of calculated coefficients and the steps expedient for the stabilization of the situation suggested.

Viszlai [10] in his paper analysed the structure of assets and capital structure in different forest companies and searched for differences between the model situation and real conditions. He used three basic financial rules for assessing and analysing assets and capital structure – a golden rule of financing, current ratio and one to one rule.

Zalewska analyse the impact of various financial ratios used to evaluate a company's liquidity and solvency on the rates of return on the shares of companies [11].

Construction industry plays a vital role in creating employment opportunities for millions of unskilled and skilled workforce in construction and allied industry firms in developing economies. The dynamic nature of construction industry and its competitive and risk prone work environment has forced the constituent firms to continuously seek strategies to improve their financial performance [12]. The success of construction contractors largely depends on the specific terms and the availability of sufficient funds for realizing planned projects. Financial issues in construction have been discussed since mid 1970s, yet no consensus about progress has been reached in the construction finance literature [13].

Pordea, Delia and Dorel to analyze the influence of the operating cash flow and the current liquidity ratio on the profitability in the case of construction companies [14]. The interpretation and evaluation of financial statement data require familiarity with the basic tools of financial statement analysis. The type of financial analysis that takes place depends on the particular interest that the creditor, stockholder, potential investor, manager and other [15]. It is important to constantly monitor and optimize the share of external resources on the total capital with respect to the recommended values given by the golden rule for the management of the company in various stages of its development [16, 17].

3. Methodology

Some methods of financial analysis were used in the analysis of the development of current liquidity in the construction industry in the Czech Republic. The financial analysis uses 3 levels of methods to determine the economic development of the selected entity:

- Elementary methods which include horizontal and vertical analyses,
- Ratio indicators, which are further divided into performance indicators (profitability indicators and turnover indicators) and financial stability indicators (liquidity indicators and debt indicators).

Two levels of financial analysis methods were used in the analysis, namely vertical analysis and current ratio. The vertical analysis was used to determine the percentage ratios of own and external resources used for financing construction companies. The formula for the vertical analysis method is as follows:

$$Determination\ of\ percentage = \frac{research\ quantity}{basic\ quantity} * 100 \quad (1)$$

The current ratio was used to determine the Tier 1 liquidity ratio, which according to the scientific literature [14] should range between 2.00-2.50. In the case of a lower value, the analysed subject is less liquid and, on the contrary, in the case of a higher value, it is inefficiently liquid. The formula for normal liquidity is given below.

$$Curent\ ratio = \frac{Current\ assets}{Current\ liabilities} \quad (2)$$

The macroeconomic indicators selected as representative indicators for certain regions of the Czech Republic were: gross domestic product, net disposable income, unemployment rate, average gross monthly wage.

Gross domestic product is the most comprehensive indicator measuring macroeconomic performance. It represents the value of goods and services produced in all industrial fields in a given territory and over a given period. GDP

expresses the total market value of goods and services produced in a country or region less the goods and services consumed as intermediate inputs in production [18].

Household net disposable income represents the amount that households can devote to final consumption, savings in the form of financial assets and the accumulation of tangible and intangible assets. [6].

The unemployment rate is expressed as the share of unemployed persons (in the population aged 15-64) expressed as a percentage, where the numerator is the number of reachable, unplaced jobseekers aged 15-64 and the denominator is the population aged 15-64 from the population balance sheet, i.e. the number of all inhabitants who have permanent residence (long-term or temporary residence in the case of foreign nationals) in the territory. Reachable jobseekers are those who are registered as unemployed and have no objective obstacle to be employed and who can take up a job immediately if a suitable one is offered. Non-located jobseekers are citizens residing in the relevant territory who are not in an employment or similar relationship with an employer or self-employed and who have applied to the Labour Office for suitable employment. [6].

The average gross monthly wage represents the proportion of wages excluding other personnel costs per employee per month. Wages and salaries include basic wages and salaries, allowances and supplements to wages and salaries, bonuses, wage and salary replacements, on-call bonuses and other components of wages and salaries charged to employees for payment in a given period. It excludes wage or salary compensation for periods of temporary incapacity for work or quarantine paid by the employer. These are gross wages, i.e., before deductions for public health insurance and social security contributions, advance payments of personal income tax and other statutory or agreed deductions. [6].

Since the analysis is focused on determining the regional ranking of current liquidity in the construction industry of the Czech Republic, a multi-criteria analysis was used to show the ranking of the most liquid region of the Czech Republic. In multi-criteria variant ranking models, the issue is specified explicitly by a list of variants A = {a1, a2, ….. ap} and a list of criteria F = {f1, f2, ….. fk} and the ranking of variants according to each criterion in the form of a so-called multi-criteria matrix (Y):

$$\begin{array}{c} \\ a_1 \\ a_2 \\ \vdots \\ a_k \end{array} \begin{array}{c} \begin{array}{cccc} f_1 & f_2 & \cdots & f_k \end{array} \\ \begin{bmatrix} y_{11} & y_{12} & \cdots & y_{1k} \\ y_{21} & y_{22} & \cdots & y_{2k} \\ \vdots & & & \\ y_{p1} & y_{p2} & \cdots & y_{pk} \end{bmatrix} \end{array}$$

Fig. 1. Multi-criteria matrix

Data collection for the analysis took approximately 6 months. The analysis includes 36 samples of construction companies. These companies were selected from 7 regions where the minimum sample size for a given region was determined as 4 samples. This minimum was set after it became clear during the data collection that some regions do not have a large number of construction companies, e.g., the Capital City of Prague had no problem in providing data, while the Karlovy Vary Region did not provide even one suitable sample. For this reason, this region was not included in the research for the time being. Samples were searched for and their basic documents were provided from the public portal of the Ministry of Justice www.justice.cz [19]. The number of samples in each considered region is shown in the following table.

Table 2. Number of samples for analysed regions. [Authors´ own work]

Regions	Capital City of Prague	Vysočina	South Moravian	Plzeň	Central Bohemian	Zlín	Moravian-Silesian
No. of samples	8	4	7	4	4	5	4

Financial statements in the form of balance sheets were collected for the 2015-2019 period for these samples. Thus, 180 financial statements were collected, from which the necessary data was taken to determine the current liquidity

and the percentage rate of external resources used to finance the entity. These financial statements were obtained from the website managed by the Ministry of Justice, where every entity registered in the commercial register is obliged to publish annual financial statements.

4. Results

The national outputs of the financial indicators published by the Ministry of Industry and Trade, which were monitored within the analysis, are shown in the following table.

Table 3. Statistical data of the Ministry of Industry and Trade. [Authors´ own work according to 2]

Year	2015	2016	2017	2018	2019
Liabilities (%)	58.32	53.28	53.09	54.80	53.14
Current Ratio	1.71	1.99	2.04	1.88	1.76

The values of the percentage rate of external resources and the values of current liquidity of the analysed construction companies in the selected regions in the monitored years are presented in the following tables.

Table 4. Total outputs of analysed data of company liabilities. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	57.54%	52.60%	48.14%	48.41%	39.54%	49.24	6
Moravian-Silesian	49.18%	53.35%	69.86%	60.94%	68.12%	60.29	3
Central Bohemian	64.97%	60.22%	51.57%	52.13%	47.91%	55.36	5
Zlín	57.84%	59.77%	56.23%	54.85%	58.35%	57.41	4
Vysočina	59.78%	66.23%	61.87%	77.01%	64.10%	65.80	2
South Moravian	75.36%	74.22%	68.93%	69.40%	66.70%	70.92	1
Capital City of Prague	52.93%	47.59%	45.65%	49.49%	50.35%	49.20	7

Table 5. Total outputs of analysed data of company current ratio. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	2.32	2.02	2.44	2.68	2.93	2.48	3
Moravian-Silesian	19.00	4.96	1.17	1.74	1.48	2.34†	4
Central Bohemian	2.07	1.93	1.43	1.49	2.17	1.82	6
Zlín	1.60	1.62	1.68	2.74	1.83	1.89	5
Vysočina	2.74	3.10	2.13	2.46	2.23	2.53	2
South Moravian	1.67	1.54	1.69	1.57	1.59	1.61	7
Capital City of Prague	2.00	3.71	6.50	3.38	4.06	3.93	1

The following tables show a comparison of the above-stated financial indicators of the analysed construction companies in selected regions of the Czech Republic with the national statistics within the construction field published by the Ministry of Industry and Trade. The national statistics have always been taken as the basis for the comparison.

† For this value, an inadequately high value in 2015 of 19.00 was removed due to a distortion caused to the resulting figure.

Table 6. Comparison of the percentage share of external resources in selected regions with national statistics. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	1.34%	1.29%	9.33%	11.66%	25.59%	9.84%	1
Moravian-Silesian	15.68%	-0.14%	-31.59%	-11.20%	-28.19%	-11.09%	5
Central Bohemian	-11.41%	-13.03%	2.86%	4.87%	9.83%	-1.37%	3
Zlín	0.83%	-12.18%	-5.92%	-0.09%	-9.81%	-5.43%	4
Vysočina	-2.51%	-24.30%	-16.54%	-40.53%	-20.63%	-20.90%	6
South Moravian	-29.23%	-39.30%	-29.83%	-26.65%	-25.51%	-30.10%	7
Capital City of Prague	9.23%	10.68%	14.01%	9.69%	5.24%	9.77%	2

It is clear from the above-stated table that construction companies in the Capital City of Prague and the Pilsen Regions appear above the values of the national statistics of the external sources of financing percentage. The construction companies in the Central Bohemian Region use external resources almost identically to the national statistics and all other regions use external resources for their financing more than the values of the national statistics. There is a strong similarity with the ranking of regions in terms of unemployment rates in terms of the regions ranking (see Table 11).

Table 7. Comparison of current liquidity values in selected regions with national statistics. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	-35.79%	-1.73%	-19.80%	-42.51%	-66.49%	-33.26%	4
Moravian-Silesian	-1,011.14%	-149.17%	42.82%	7.29%	15.78%	-218.88%	7
Central Bohemian	-20.97%	2.91%	29.80%	20.86%	-23.14%	1.89%	1
Zlín	6.22%	18.80%	17.86%	-45.57%	-3.73%	-1.28%	2
Vysočina	-60.44%	-55.97%	-4.27%	-30.64%	-26.48%	-35.56%	5
South Moravian	2.47%	22.78%	17.33%	16.67%	9.71%	13.79%	3
Capital City of Prague	-17.14%	-86.46%	-218.82%	-79.86%	-130.58%	-106.57%	6

It is clear from the above-stated table that the liquidity is almost identical to the national values in the Central Bohemian and Zlín Regions. Other regions show values higher than the national statistics.

Tables 8 to 11 show macroeconomic indicators for the 2015-2019 period. The values are taken from the Czech Statistical Office sources.

Table 8. Gross domestic product at current prices in million CZK. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	230,887	239,439	254,606	267,405	278,672	254,202	5
Moravian-Silesian	435,540	450,316	471,366	500,421	516,623	474,853	4
Central Bohemian	517,227	550,797	591,170	613,373	667,367	587,987	2
Zlín	218,106	225,223	239,828	247,803	266,509	239,494	6
Vysočina	180,774	187,382	200,139	205,576	221,076	198,989	7
South Moravian	487,921	497,492	527,915	569,468	601,779	536,915	3
Capital City of Prague	1,231,287	1,285,249	1,366,020	1,479,057	1,566,024	1,385,527	1

On the basis of gross domestic product, the most productive region is clearly the Capital City of Prague, followed by the Central Bohemian Region. On the other hand, the least efficient region is the Vysočina Region.

Table 9. Net disposable income of households in million CZK. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	127,855	128,151	136,765	142,946	156,334	138,410	5
Moravian-Silesian	235,934	241,557	255,397	272,696	287,270	258,571	4
Central Bohemian	303,933	325,990	339,450	370,009	393,158	346,508	2
Zlín	121,068	120,882	127,399	135,132	143,909	129,678	6
Vysočina	106,880	110,180	116,309	125,378	133,075	118,364	7
South Moravian	255,496	257,790	273,347	289,566	312,323	277,704	3
Capital City of Prague	358,642	382,495	439,540	465,410	482,372	425,692	1

The ranking of regions by the net disposable income is identical to the ranking of regions by their performance (see Table 8).

Table 10. Average gross monthly wage (by place of work) in CZK. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	24,664	25,878	28,220	30,343	32,371	28,295.2	3
Moravian-Silesian	23,712	24,545	26,156	28,226	29,925	26,512.8	6
Central Bohemian	25,824	27,047	29,142	31,843	34,218	29,614.8	2
Zlín	22,627	23,756	25,580	27,842	29,669	25,894.8	7
Vysočina	23,368	24,720	26,521	28,687	30,673	26,793.8	5
South Moravian	24,924	25,906	27,668	29,826	32,080	28,080.8	4
Capital City of Prague	32,752	34,069	35,842	38,255	40,741	36,331.8	1

When comparing regions by average gross monthly wages, differences in the ranking are already visible, unlike in Tables 8 and 9. The first place is again clearly occupied by the Capital City of Prague, the second place is occupied by the Central Bohemian Region, however, the other rankings are different. The lowest average gross monthly wages are in the Zlín Region. (See table 10)

Table 11. Share of unemployed persons (in the population aged 15-64) in %. [Authors´ own work]

Year	2015	2016	2017	2018	2019	Average	Order
Plzeň	4.62	3.56	2.55	2.12	2.33	3.0	2
Moravian-Silesian	8.56	7.45	5.77	4.65	4.44	6.2	7
Central Bohemian	5.41	4.31	3.17	2.64	2.44	3.6	3
Zlín	5.98	4.92	3.43	2.61	2.43	3.9	4
Vysočina	6.22	5.17	3.80	3.02	2.70	4.2	5
South Moravian	7.01	6.11	4.60	3.86	3.48	5.0	6
Capital city of Prague	4.20	3.35	2.34	1.93	1.90	2.7	1

The capital city of Prague is clearly in the first place in terms of the monitored macroeconomic indicators, as is the case with the comparison of regions according to the share of unemployed persons. The second and third place is occupied by the Plzeň and Central Bohemian Regions. The Moravian-Silesian Region is the worst in the comparison of the share of unemployed persons. (See table 11)

In order to display the overall regional assessment of current liquidity in the construction industry of the Czech Republic in relation to macroeconomic indicators of the corresponding region, a multi-criteria analysis was applied using weighted criteria to objectively display the resulting values. The highest weights were assigned to the indicators of current liquidity and percentage of external resources share, and macroeconomic indicators were assigned a constant weight. The weighted criteria were set to a total value of 1.00 with the following division:

- Current liquidity - weight $K_A = 0.40$

- External resources - weight $K_B = 0.20$
- Gross domestic product - weight $K_C = 0.10$
- Net disposable income - weight $K_D = 0.10$
- Average gross monthly wage - weight $K_E = 0.10$
- Unemployment rate - weight $K_F = 0.10$

A multi-criteria matrix which is shown in the following table was plotted based on the above-stated outputs (see Tables 4, 5, 8, 9, 10, 11) with the indicators represented in the following order with marking:

- Gross domestic product - *A*
- Net disposable income of households - *B*
- Average gross monthly wage - *C*
- Share of unemployed persons - *D*
- Percentage share of external financing - *E*
- Current liquidity - *F*

Table 12. Multi-criteria matrix. [Authors´ own work]

Region	A	B	C	D	E	F
Capital city of Prague	1	1	1	1	7	1
Central Bohemian	2	2	2	3	5	6
Plzeň	5	5	3	2	6	3
Vysočina	7	7	5	5	2	2
South-Moravian	3	3	4	6	1	7
Zlín	6	6	7	4	4	5
Moravian-Silesian	4	4	6	7	3	4

The following table shows the multi-criteria matrix using the weighted criteria assigned to each indicator (macroeconomic and financial) including the total sum and ranking of the regions in the regional liquidity assessment in the construction industry in the Czech Republic in relation to regional performance.

Table 13. Multi-criteria matrix with weighed criteria. [Authors´ own work]

Region	*A*	*B*	*C*	*D*	*E*	*F*	*Sum*	Order
Capital city of Prague	0.1	0.1	0.1	0.1	1.4	0.4	2.20	1
Central Bohemian	0.2	0.2	0.2	0.3	1	2.4	4.30	4-5
Plzeň	0.5	0.5	0.3	0.2	1.2	1.2	3.90	3
Vysočina	0.7	0.7	0.5	0.5	0.4	0.8	3.60	2
South-Moravian	0.3	0.3	0.4	0.6	0.2	2.8	4.60	6
Zlín	0.6	0.6	0.7	0.4	0.8	2	5.10	7
Moravian-Silesian	0.4	0.4	0.6	0.7	0.6	1.6	4.30	4-5

It is clear from the above-stated table that, taking into account macroeconomic indicators and especially financial indicators, the most liquid region is the Capital City of Prague and the least liquid is the construction industry in the Zlín Region.

5. Conclusions

The aim of the article was to present a regional assessment of liquidity in the construction industry in the Czech Republic. This paper used a 5-year timeline, the 2015-2019 period, for its analyses and conclusions. 36 construction companies which were categorized into regions, were used where the minimum number of samples was always 4. The Czech Republic is divided in 14 regions, however, due to the beginning of the research, only 7 regions were used for the analyses.

The assessment was based both on financial indicators and on macroeconomic indicators that represent the performance of the corresponding region. In order to link these macroeconomic and microeconomic views, a multi-

criteria matrix, where weighted criteria were established, was used. The financial indicators were given the highest weight and the macroeconomic indicators were given a constant weight value.

The above-stated analyses show that in the regional assessment of current liquidity in relation to macroeconomic indicators representing the performance of the region within the construction industry of the Czech Republic, three regions ranked best in almost all factors, namely the Capital City of Prague, the Central Bohemian and the Pilsen Regions. This conclusion was confirmed by the multi-criteria matrix used with the weighted criteria. It should also be noted that the first two mentioned regions have the largest number of inhabitants, which certainly has an impact on the overall ranking. Although there are national statistics on the values of financial ratios for individual sectors, it is clear from the presented research and from the research conclusions presented in Table 6 and Table 7 that there is a need to evaluate sectors not only on the national level, but to focus on individual regions that show different performance, to avoid subjective or general views.

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