



PERSONNEL COSTS IN THE CZECH CONSTRUCTION SECTOR: INVESTIGATING THE EFFECT OF COMPANY SIZE

Scientific paper / Znanstveni rad

(Received: 5 October 2017; accepted: 28 November 2017)

Martina Paulišová

Brno University of Technology, Faculty of Civil Engineering, Czech Republic, BSc.

Tomáš Hanák

Brno University of Technology, Faculty of Civil Engineering, Czech Republic, Associate Professor

Corresponding author: hanak.t@fce.vutbr.cz

Abstract: Managing personnel costs is important in all companies, especially in those whose production is labor intensive. The construction sector therefore qualifies as a suitable area for analyzing issues associated with these costs. The aim of this study is to find out whether company size affects personnel cost management under various circumstances. Four research hypotheses focus on the relationships among and the relative importance of personnel costs, use of standards, range of employee benefits offered, and economic actions taken when faced with an economic crisis. The evaluation of hypotheses is supported by using the chi-square test of independence with the aim of confirming or rejecting the statistical significance of relationships between the examined categorical variables. Results have confirmed a significant effect of company size. Several research implications and suggested future research directions are also presented in the conclusion of this paper.

Keywords: benefit; construction company; costs; personnel; wage

TROŠKOVI ZAPOSLENIKA U ČEŠKOM GRAĐEVINSKOM SEKTORU: ISTRAŽIVANJE UTJECAJA VELIČINE TVRTKE

Sažetak: Troškovi upravljanja osobljem važan su dio financijskog upravljanja u svim tvrtkama, naročito onima čija produktivnost ovisi o radnoj snazi. Građevinarstvo je prikladan primjer za analizu problema spomenutih troškova. Cilj ove studije je utvrditi utječe li veličina tvrtke na troškove upravljanja zaposlenicima u različitim okolnostima. Četiri istraživačke hipoteze usredotočuju se na odnose među spomenutim troškovima i relativnu važnost među njima, korištenje standarda, raspon ponuđenih pogodnosti za radnike i ekonomske aktivnosti poduzete prilikom suočavanja s ekonomskom krizom. Ocjenjivanje hipoteza je podržano či-kvadrat testom neovisnosti radi potvrđivanja ili odbacivanja statističke važnosti veze između ispitivanih kategorijskih varijabli. Rezultati su potvrdili veliku važnost utjecaja veličine tvrtke. U zaključku ovoga rada prikazane su neke implikacije istraživanja i predložene buduće smjernice istraživanja.

Ključne riječi: koristi; građevinska tvrtka; troškovi; zaposlenici; plaća



1 INTRODUCTION

Human resources and labor welfare are important areas that companies must successfully manage. On the one hand, a stable and high-quality team of workers is a crucial prerequisite enabling quality and continuous production; on the other hand, capable employees must be adequately rewarded. Therefore, the ratio between the quality of staff and personnel costs must be well balanced as high personnel costs could potentially be at the expense of the company's competitiveness and its ability to win contracts.

This paper deals with the issue of personnel costs in the construction industry, and the analysis was made using data collected in the Czech Republic. More specifically, the present research aims to examine the ways in which workers are rewarded, the ways their wages are calculated, and which employee benefits are usually preferred. These issues are also considered from the perspective of company size. This paper is structured as follows. First, the research background is presented; second, hypotheses and research methodology are described; third, results and discussion are provided; and fourth, the main conclusions are formulated, and future research directions outlined.

2 RESEARCH BACKGROUND

The construction industry is among the sectors with a high demand for employees. In the Czech Republic, the average number of employees in the construction sector was approximately 215,000 compared to the country's total population of 10,538,000 in 2014 [1]. Although construction work is realized with the support of a high number of specialized machines, it remains to be a labor-intensive activity, which is clear given the large amount of jobs that can be found, such as bricklayers, concrete workers, carpenters, and machine operators. Large-scale construction projects and megaprojects [2, 3] require the deployment of thousands of workers. The analysis of price elements for construction work on water engineering systems has shown that costs related to salaries, accommodation, food for direct labor, and overhead staff at the Kozjak Hydropower Plant were indeed significant, amounting to 43% of the total project costs [4]. An example of cost calculation of construction work unit price containing labor costs is presented by Plebankiewicz et al. [5].

The satisfaction of employees with remuneration is important. In this context, Poongavanam and Viswanathan [6] conducted a research analyzing construction employees' opinion on wage and benefits in Chennai. They revealed that 60.8% of respondents were highly satisfied or satisfied with their wage. It should be noted that relatively high satisfaction is balanced by physically demanding work, often under difficult conditions. Construction activities are considered to be one of the most dangerous and physically demanding occupations resulting in high numbers of injuries and illnesses [7].

The amount of wage is a factor that certainly motivates employees; however, Leete [8] suggests that the development and maintenance of employee motivation should be pursued through employees' perception of wage equity and employer fairness as well. As many companies decide to increase employees' economic security by providing benefits in addition to direct compensation [9], the issue of benefits cannot be ignored. For this reason, this aspect is also presented in this paper. The amount of wage should correspond to labor productivity. In this regard, Nahod and Knezovic [10] reported that regularity of salary and job satisfaction in Croatia belong to the most important economical and socio-psychological impact factors respectively, when in general, economic factors have higher importance than socio-psychological factors.

With regard to the way wages are managed, Czech construction companies can use the Proceedings of the Construction Work Activities developed in 1982 in cooperation with the former Ministry of Industry [11]. That way, tariff classes can be easily established in the company. Standards can be applied to calculate the amount of task wage for workers. Such standards stipulate the amount of work to be done in a given time (e.g., labor hour/square meter for roof insulation) [12].

The construction sector, apart from being an important industrial employer, also accounts for a sizeable proportion of most countries' gross domestic product (GDP) [13]. It is therefore important to know what strategies companies use during an economic crisis. Kozumplikova et al. [14] argue that construction activities have a very strong influence on the GDP; however, for smaller areas, the impact of public investments shows a significant time delay. In Greece, it was revealed that wage cuts were used as an economic action of crisis management in



construction [15]. In this regard, Tansey et al. [16] identify freezing/cutting of salaries and laying off employees as one of the most common steps in personnel strategies of Irish and UK construction contractors. Construction sector activity is highly dependent on the performance of the economy as a whole since public procurement creates a significant part of the construction market (especially in the area of large transport infrastructure projects).

There are many studies that address the effect of a company size from different points of view. For instance, Bonafede et al. [17] analyzed whether there was any difference in employers' perception of occupational health and safety management with respect to different company sizes; other relevant studies include the effect of company size on the adoption of Twitter for financial reporting [18], the impact of company size on construction management documents processing and use [19], the perception of work environment priorities [20], and differences in injury prevalence among apprentices in the building and construction industry in Norway [21]. The research presented in this paper follows this direction and shows new original findings concerning the effect of company size on personnel cost management.

Considering the labor-intensive character of the construction industry and the importance of wages and benefits to motivate and secure economic autarchy of employees, this research presents a narrow insight into the area of human resource management from companies' point of view.

3 HYPOTHESES AND RESEARCH METHODOLOGY

3.1 Hypotheses

Based on the review of available literature, the following four hypotheses were raised.

It can be expected that in smaller companies the relative importance of personnel costs as compared to total costs is higher. Accordingly, hypothesis 1 (H1) was formulated as follows:

H1: The size of the company influences the relative importance of personnel costs.

As larger companies have more employees, it can also be expected that they will tend to use standards to calculate the amount of wages more frequently. Accordingly, hypothesis 2 (H2) was formulated as follows:

H2: The size of the company influences the frequency of the use of standards.

As opposed to smaller companies, larger companies may have greater possibilities to offer employee benefits. Accordingly, hypothesis 3 (H3) was formulated as follows:

H3: The size of the company influences the range of employee benefits offered.

Finally, it was investigated whether the recent economic crisis forced companies to reduce personnel costs by means of reducing the number of employees and/or cutting wages. Accordingly, hypothesis 4 (H4) was formulated as follows:

H4: The size of the company influences its ability to cope with an economic crisis in terms of not being forced to reduce personnel costs.

3.2. Methodology

To address the research hypotheses, a web-based questionnaire was carefully prepared. The questionnaire was divided into 5 sections. Section 1 dealt with general questions (main objects of business, number of employees). The number of employees constitutes an important piece of information as it is used to measure the company size (<10 micro, <50 small, <250 medium, and \geq 250 large company). Definition of these four categories is based on Commission Recommendation [22]. Section 2 addressed the significance of personnel costs (share of personnel costs regarding total costs) and the way wages were managed (type of wage, use of tariff classes, use of standards). Section 3 dealt with employee benefits (list of benefits offered, share of benefits regarding total personnel costs). Section 4 aimed to sort individual personnel cost items by their significance in the company and, finally, Section 5 inquired about measures the companies adopted in response to the recent global economic crisis (wage cuts, layoffs).

As the sample contains quantitative data, the statistical software Minitab was used to evaluate them. To evaluate the data concerning H1, H2, H3, and H4, the chi-square test of independence was used to show whether the relationships among the categorical variables examined were statistically significant. The data was tested at a



95% confidence interval. Using the chi-square test of independence, the null hypothesis (H0) refers to the two categorical variables not related, while the alternative hypothesis indicates that a statistically significant relationship exists.

4 RESULTS AND DISCUSSION

4.1. Basic characteristics of the sample

In total, 930 companies in the Czech construction sector were invited to participate in this research initiative. The list of companies was compiled based on the information extracted from the database of members of the Association of Building Entrepreneurs of the Czech Republic [23] who provided valid email addresses. Of these, 128 respondents filled in and submitted data, which represents a 13.8% response rate. The sample size can be considered as sufficiently large to capture the situation in this study area (the Czech Republic). The response rate is similar to that of other studies using e-surveys where the response rate was 13.9% [24]. Table 1 shows the distribution of the sample based on company size. Because the representation of large companies in the sample is small (just 9 respondents), it was decided to merge the categories of medium and large companies (see Table 1) to allow proper statistical evaluation of the data. Similarly, other authors [25] had only a low proportion of large companies in their sample. The data was collected from April 2017 to June 2017.

Regarding the main objects of the business, the individual respondents could select multiple options as companies in the construction sector commonly offer a wide range of services/work. The data shows that 93 companies perform construction work, 36 companies offer services in costing, and 35 companies carry out project and design activities (these are the three most frequent answers regarding the objects of the business). No company had to be removed from the sample on the basis of these responses.

Table 1 Distribution of the sample from the perspective of company size

Original categories	Absolute frequency	Relative frequency	Adjusted categories	Absolute frequency	Relative frequency
Micro	43	33.6%	Micro	43	33.6%
Small	42	32.8%	Small	42	32.8%
Medium	34	26.6%	Medium & Large	43	33.6%
Large	9	7.0%			
Total	128	100.0%	Total	128	100%

4.2 Personnel costs and wages

It was examined whether the size of the company affects the relative importance of personnel costs in comparison to total costs. The relative importance of personnel costs is measured in % in three categories: low (0 – 20%), medium (21 – 40%), and high (> 40%); as personnel cost ratio (PCR) = amount of personnel costs/total costs. The input data for the statistical testing is presented in Table 2.

Table 2 Distribution of the sample from the perspective of PCR

PCR	Low	Medium	High
Micro	14	10	19
Small	15	17	10
Medium & Large	17	19	7
Total	46	46	36

The data in Table 2 clearly shows that the importance of PCR decreases with increased company size. Relative frequency of a high PCR is 44.2%, 23.3%, and 16.3% for micro, small, and medium & large companies, respectively. It appears that especially micro companies should carefully consider making any changes in human resources. Employing just one extra worker could cause an immense increase in personnel costs while layoffs can result in excessive workload for the remaining employees.



Results also show that only 37% of companies employing manual workers use tariff classes to determine wages in the individual workers' professions. A majority of the companies have created their own catalogue of tariff classes instead of using the Proceedings of the Construction Work Activities.

The χ^2 value with degree of freedom (df) = 4 is higher than the critical value (9.483). Using statistical software (see Figure 1), the p-value was calculated ($= 0.047$). As the p-value $> \alpha$ (0.05), it was ascertained that there is a statistically significant connection between entity size and importance of personnel costs. Sufficient evidence exists to reject H0 regarding the independence of the examined variables. Accordingly, H1 was confirmed.

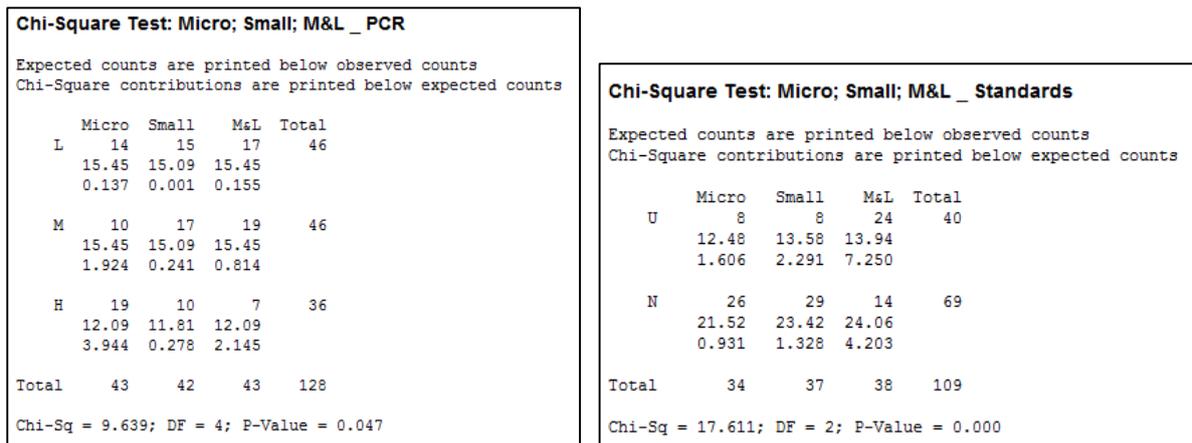


Figure 1 Software printout of results relating to H1 (on left) and H2 (on right)

H2 dealt with the way direct labor wages are calculated. In the construction industry, the amount of wage typically depends on the amount of work done if the amount of work is measurable in physical units. For this reason, standards expressing how many physical units of work (e.g., square meters of plaster) should be realized in a specific time period (e.g., one hour) can be used. The questionnaire inquired whether companies used their own standards, adopted standards, or did not use any standards at all. Data relating to the H2 are shown in Table 3. As some companies do not use direct labor, category N/A was added.

Table 3 Distribution of the sample from the perspective of the use of standards

Standards	Own	Adopted	No use	N/A
	Use		No use	
Micro	6	2	26	9
Small	6	2	29	5
Medium & Large	18	6	14	5
Total	30	10	69	19

As the use of the chi-square test of independence is inappropriate if the expected frequency is less than 5 in more than 20% of cells, data in Table 3 was merged into two categories: "Use," which represents "own" and "adopted" together, and "no use," while "N/A" is not considered in the analysis.

The χ^2 value with df = 2 is higher than the critical value (5.991). Using statistical software (see Figure 1), the p-value was calculated ($= 0.000$). As the p-value $> \alpha$ (0.05), it was ascertained that there is a statistically significant relation between the entity size and use of standards. Sufficient evidence exists to reject H0 regarding the independence of the examined categorical variables. Accordingly, hypothesis H2 was confirmed. The prevailing use of company standards over adopted standards can be attributed to the fact that standards need to be adjusted to the specific conditions in a particular company to reach the accuracy required. This is why innovative actions need to be undertaken in the field of standards, for example, regarding the currently available software solutions.



4.3 Benefits

As the range of employee benefits is wide, identifying the most popular employee benefits used in the construction industry was of interest. Respondents were asked to indicate whether they used 10 pre-defined benefits and could also suggest other benefits not included in the list. The results are shown in Figure 2.

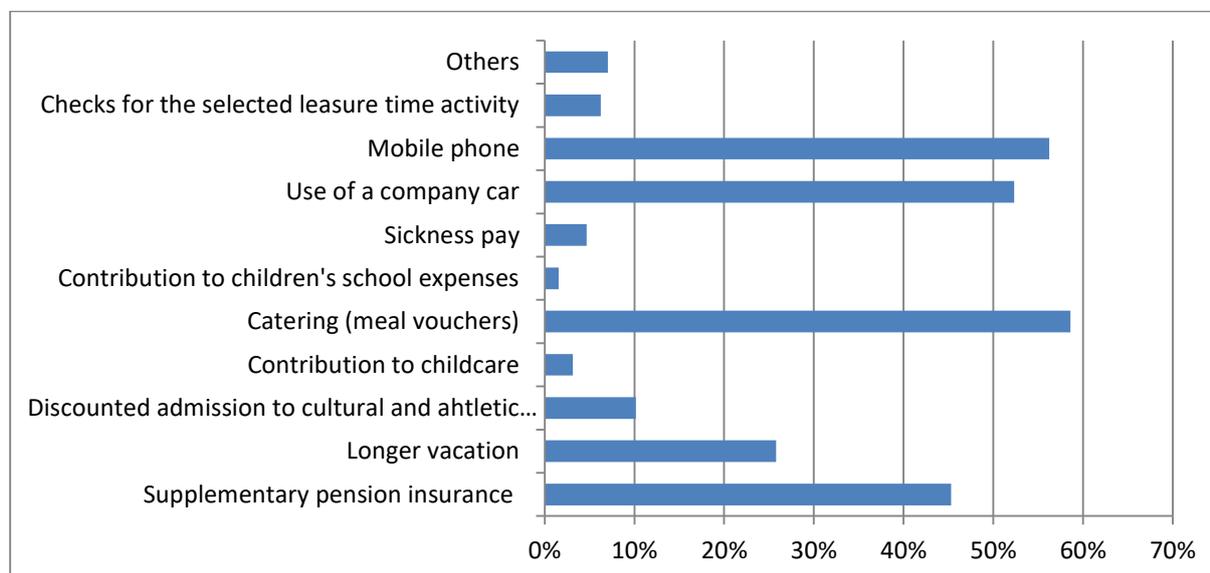


Figure 2 Use of benefits

Figure 1 indicates that the three most used employee benefits can be identified as follows: catering (58.6%), mobile phone (56.3%), and the use of a company car (52.3%). The top position of the employer's contribution to lunch benefit (e.g., meal vouchers) can be attributed to the fact that this expense is not subject to tax on the employee's part and is a tax-deductible expense for employers, motivating employers to use it. A company mobile phone and the use of a company car ranked on the list as second and third, respectively; however, it should be noted that in contrast to catering, these two benefits are usually offered to middle and senior management employees only. Contribution to a supplementary pension insurance (45.3%) is another significant benefit offered to all employees.

In order to evaluate H3, data on the frequency the various benefits are used within the categories of individual company size were collected and analyzed (see Table 4). The distribution of frequency is purposely split into three categories. Since catering and supplementary pension insurance contribution are generally considered to be widespread benefits in the Czech Republic, the first category called "basic" includes companies offering up to two benefits. Additionally, mobile phones and company cars are often available to managers. For this reason, the second category called "extended" includes companies offering three or four benefits. The last category called "premium" then includes companies offering five or more benefits.

The data clearly shows that the range of benefits increases with the size of the company as measured by the number of employees. The χ^2 value with $df = 4$ is higher than the critical value (9.483). Using statistical software (see Figure 3), the p-value was calculated ($p = 0.000$). As the p -value $> \alpha$ (0.05), it was ascertained that there is a statistically significant relation between company size and range of benefits offered. Sufficient evidence exists to reject the H_0 regarding the independence of these two categorical variables. Accordingly, H3 was also confirmed.

Table 4 Range of benefits offered by companies

Category	Basic	Extended	Premium
Micro	37	5	1
Small	23	14	5
Medium & Large	8	16	19
Total	68	35	25



Chi-Square Test: Micro; Small; M&L _ Benefits				
Expected counts are printed below observed counts				
Chi-Square contributions are printed below expected counts				
	Micro	Small	M&L	Total
B	37	23	8	68
	22.84	22.31	22.84	
	8.773	0.021	9.645	
E	5	14	16	35
	11.76	11.48	11.76	
	3.884	0.551	1.531	
P	1	5	19	25
	8.40	8.20	8.40	
	6.518	1.251	13.383	
Total	43	42	43	128
Chi-Sq = 45.556; DF = 4; P-Value = 0.000				

Figure 3 Software printout of results relating to H3

Medium and large companies are therefore in a better position to provide a wider range of benefits, mainly because of a lower PCR value (see Table 2). For micro companies it is particularly difficult to offer more than just a basic range of benefits, as any increase of personnel costs could jeopardize their ability to submit competitive bids in tender procedures.

4.4 Identifying the most significant personnel cost items

The significance of the individual personnel cost items in companies was analyzed regardless of company size. In the questionnaire, respondents were asked to select up to three of the most significant personnel cost items from a predefined list containing 12 items (the list did not include wages) and they could propose a single new item of their own. The list of personnel cost items showing the order of importance is given in Table 5.

Table 5 Personnel costs items according to their importance in company

Ranking	Personnel cost item	Frequency
1.	Catering	42
2.	Company car	25
3.	Education and training	19
4.	Mobile phone	11
4.	Health and safety	11
6.	Corporate events for employees	10
7.	Sickness pay	2
8.	Teambuilding	1
9.	Life insurance	1

Only nine items were identified by respondents as belonging to the three most important personnel cost items. The list revealed that benefits count more than other types of personnel costs such as education and training, health and safety, corporate events for employees, or organizing teambuilding events.

4.5 Impact of the recent economic crisis on personnel costs

Table 6 shows how companies responded to the economic crisis in terms of reducing personnel costs. Respondents were asked to indicate whether their company was forced to reduce the number of employees and reduce wages or whether the crisis did not significantly affect them in this regard.

**Table 6 Economic crisis effect**

Effect	Reducing wages	Reducing number of employees	Reducing both wages and number of employees	No effect
Micro	5	8	0	30
Small	2	14	1	25
Medium & Large	5	13	7	18
Total	12	35	8	73

Surprisingly, most respondents – 73 out of 128 companies (i.e., 57%) – reported that the recent economic crisis did not force them to either reduce wages or reduce the number of employees. Companies mostly preferred to reduce the number of employees over reducing wages. This allowed companies to keep the best employees who would help them overcome the crisis and who would also be important for post-crisis recovery. The data also indicates that small and micro companies were able to better cope with the crisis in this regard than large companies as these are often largely dependent on public procurement, which greatly decreased during the crisis. This can be attributed to the fact that certain companies such as micro companies are often narrowly specialized and cannot lay off individual workers trained in specific professions as this would deprive them of their unique skills.

In order to overcome the occurrence of expected frequencies lower than five in three cells, the data in Table 6 was merged into two categories: “Action” representing “reducing wages,” “reducing number of employees” and “reducing both wages and number of employees” together, and “no effect.” The χ^2 value with $df = 2$ is higher than the critical value (5.991). Using statistical software (see Figure 4), the p-value was calculated ($= 0.030$). As the p-value $> \alpha$ (0.05), H_0 about the independence of examined variables can be rejected. The data indicates that the smaller the company, the lower the tendency to perform personnel-related economic actions. Accordingly, H_4 was also confirmed.

Chi-Square Test: Micro; Small; M&L _ Benefits				
Expected counts are printed below observed counts				
Chi-Square contributions are printed below expected counts				
	Micro	Small	M&L	Total
B	37	23	8	68
	22.84	22.31	22.84	
	8.773	0.021	9.645	
E	5	14	16	35
	11.76	11.48	11.76	
	3.884	0.551	1.531	
P	1	5	19	25
	8.40	8.20	8.40	
	6.518	1.251	13.383	
Total	43	42	43	128
Chi-Sq = 45.556; DF = 4; P-Value = 0.000				

Figure 4 Software printout of results relating to H4

5 CONCLUSIONS

The research results show that there is a significant effect of company size on various aspects of personnel management in the Czech construction industry. All four investigated research hypotheses concerning the relationship between company size and importance of personnel costs, use of standards, range of benefits offered, and ability to cope with the economic crisis in terms of not reducing personnel costs, were confirmed. The



relationships among the importance of personnel costs, normative use, and range of benefits offered were tested using the chi-square test of independence to verify their statistical significance.

Several research implications can be inferred from the results:

A larger number of employees reduces the importance of personnel costs within the company. However, if relative significance decreases, their absolute amount increases. That is why direct labor should be remunerated by using task wages and appropriate standards. The results show that many companies are not using standards at all. This can be justified if a company is performing specialized jobs where standards do not exist or if their application is not suitable. However, the large proportion of companies without standards (63%) indicates that managing personnel costs, in many cases, can be substantially improved by adopting standards.

A wider range of benefits can especially be expected in larger companies. Various benefits are used to motivate the existing staff and to increase the attractiveness of the company for potential new employees. The results suggest that decision-making concerning the choice of an employer may be significantly influenced by the extent to which benefits are offered. This is important especially for key personnel who perform specialized tasks or bring a competitive advantage to the enterprise.

The resilience of companies in the Czech construction sector may differ according to company size. The choice of actions taken to cope with an economic crisis should therefore be based on the specific features of the individual companies; size being one of them.

The present research has raised some additional questions that could be addressed by future studies. These include the following two issues in particular: (1) The construction sector covers many different types of projects ranging from transport construction projects, housing estates, and utility networks to structures such as power plants. Consequently, it incorporates many specialized fields. Therefore, taking into account companies' specialization could reveal new and potentially interesting connections and relationships. This will require extending the research sample in order to achieve a sufficient number of respondents in each investigated category (infrastructure projects, water management structures, etc.). (2) Employees' opinions concerning the optimum ratio between wage and benefits offered also seems to be a promising area for further research. Comparing the incentives offered by companies with employees' expectations could potentially contribute to a better understanding of these two parts of the labor market.

ACKNOWLEDGMENT

This paper was written as a part of the project No. LO1408 "AdMaS UP – Advanced Materials, Structures and Technologies" supported by the Ministry of Education, Youth and Sports of the Czech Republic under the "National Sustainability Programme I."

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Please cite this article as:

Paulišová, M., Hanák, T.: Personnel Costs in the Construction Sector: Investigating the Effect of Company size, *Electronic Journal of the Faculty of Civil Engineering Osijek-e-GFOS*, 15, pp. 13-22, <https://doi.org/10.13167/2017.15.2>