

# Perception of Cost Behaviour in Industrial Firms with Emphasis on Logistics and its Costs

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*Results are presented from quantitative research as part of a project on cost variability and cost management systems. The main objective was to analyze principal findings stemming from determining perception of cost behaviour in practice of industrial firms. Special attention was paid to selected cost groups, especially logistics costs. The main part presents results verified through statistical inspection of dependence relations. Key discoveries comprise significant drawbacks for manufacturing enterprises and reservations they hold about overhead cost management. Additionally, it was found that the share of overheads remained relatively high. Furthermore, confirmation was made on the close differences between company size and diligence paid to managing variable and fixed costs. It was also confirmed that senior executives were uninformed about asymmetric cost behaviours or the influence of factors beyond production capacity. Logistics costs were identified from the perspective of the cost behaviour problem. Crucial findings are discussed in the final part of the paper.*

**Keywords:** Logistic, cost of logistics, cost behaviour, overheads, asymmetric cost, costing system.

## 1. INTRODUCTION

The level of international competition is steadily rising, so managers are able to achieve detailed cost information to facilitate effective management. The opportunity to look in to company costs is one of the most crucial tasks for effective cost management, and it describes a key area of company performance. Another aspect is analysis of cost behaviour. Accordingly, an understanding of cost behaviour is crucial for managers and accountants to ensure that data are exported and utilized in order to make effective decisions. [1] They can then variously employ this comprehension of costing, e.g. for flexible budgeting, breakeven point calculations, assessing the performance of divisions, or for short- and long-term decision-making [2].

The article therefore deals with empirical research focused on the current state of cost management in manufacturing plants in the Czech Republic. The authors devote themselves to testing two main hypotheses. When they first verify the existence of a significant link between the size of the company and the amount devoted to managing variable and fixed costs. The second hypothesis verifies the existence of a significant relationship between the size of society and the consideration of cost variability according to parameters other than production.

The main goal of this paper is to determine the level of perception of cost behaviour in practice and to discern

cost aspects connected with the size of a company. This objective was pursued through conducting quantitative research within a project named “Variability of cost groups and its projection in the costing systems of manufacturing enterprises”. Another aspect is to analyse the current status of cost management as applied by manufacturing enterprises in the Czech Republic.

Attention is paid to particular comments made in response to a questionnaire, with emphasis placed on cost structure, overhead cost management and utilization of costing systems by manufacturing enterprises, also as the perception of potential asymmetric cost behaviour. There shall also be analysis of management approaches to overheads and fixed costs, primarily, and their dependence on certain factors. Another partial objective herein is to discuss the selected cost group – costs of logistics, which can give rise to asymmetrical behaviour in costs as well as the emergence of sticky costs.

## 2. LITERATURE REVIEW

When applying methods of financial and management accounting methodologies, different countries of the world usually use different approaches to the classification of costs. The cost accounting method uses financial accounting in the financial statements. This classification categorizes the natural cost types according to the form of input consumed. However, the term cost is used in managerial accounting in many ways. There are a variety of costs that are classified differently according to immediate management needs, eg to prepare external financial reports, inform decisions, etc. [3].

Drury [4] states that the main division divides direct and indirect costs. Direct material and labour belong to

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direct costs. They are accurately and easily identified with a particular cost object. Conversely, this is with indirect costs. Indirect costs can not be specifically and exclusively identified with a given cost object. [4]; [5]; [6]. This form of cost classification is fundamental in cost allocation procedures, whereby costs are assigned to particular cost objects, with the intention of further utilization in cost management. Circumstances under which there is a high instance of indirect costs disallow use of simple cost assignment procedures, also undermining application of more sophisticated allocation techniques that would otherwise provide accurate cost assignment.

Issues related to an increasing proportion of overhead costs and any subsequent impact on cost management were defined by Nimocs et al. [6], such difficulties consequently triggering contemporary trends to reduce such overhead costs or make cuts, as concisely summarized by Willeman [7]. Indeed, Hansen et al. [8] further comment that cost assignment is a key process within a cost accounting system. Studies have shown that up to 80% of companies continue to use (or have switched back to) traditional product-costing methods, despite the fact that many accountants within these companies express dissatisfaction with relying on the outputs of such cost accounting systems for decision-making purposes [9]. But nowadays we can find out alternative approaches, when many consultant companies dealing with the implementation of costing and calculation systems offer alternative calculation systems based on performed activities and processes – eg. Activity Based Costing systems. [10].

A traditional model of cost behaviour identifies cost as separable into fixed and variable components. The latter are modified in proportion with changes that occur in performance volume, but fixed costs remain unaltered as volume changes within a relevant range. [11] In practice, it is necessary to distinguish between these groups of costs. Indeed, the narrative can be about purely variable costs, as well as completely fixed, semi-variable and semi-fixed ones [4]. According to Bhattacharyya [12], the term cost behaviour specifically refers to changes in costs associated with alteration in the level of activity. Therefore, cost behaviour does not encompass alterations in costs due to fluctuation in inflation, level of productivity or production methods, and so on. From a management perspective, it is important to know how costs behave in order to make reliable decisions on products, as well as for the goals of planning and evaluating performance [13]. Knowing how variance in activity output affects costs is an crucial part of planning, control, and decision-making processes [8].

As Banker and Byzalov [14] stated, understanding cost behaviour is an essential issue in cost accounting. Uncertainty over demand is likely to affect commitments of managers regarding “fixed” activity resources, which are selected before actual demand is realized. From the perspective of a company executive, such realized demand is viewable as a random variable drawn from a certain distribution, and demand uncertainty characterizes variance in this distribution. By choosing committed capacity levels, managerial

staff are forced to consider the gamut of likely scenarios about demand. Therefore, demand uncertainty is likely to affect their resource commitments, hence also influencing the combination of fixed and variable costs in the short-term cost structure of the firm. Fixed and variable costs are short-term concepts, but “in the long run, all costs are variable” in the sense that all resources are subject to managerial discretion over the long term (see, for example [8]; [15]; [16]). Bhattacharyya [12] further specifies factors that could affect cost behaviour. Like most authors, he refers to periods of time or managerial decisions. However, he also highlights the relevance of the type of business and technology, because cost behaviour may additionally depend on the type of products, size of product units, methods of production, or if there is a need to reconfigure production equipment (e.g. due to serial production); these representing important factors of cost behaviour.

Costs are caused by resources, including both activity resources and physical capital. Cost behaviour then reflects resource adjustment in response to activity changes. Some resources, such as indirect skilled labour, are costly to adjust in the short term so are predisposed to generating fixed costs. Other resources such as direct materials can be adjusted flexibly in the short term, hence are consumed as needed depending on the realized demand, giving rise to variable costs. Thus, whether a cost is fixed or variable depends on the level of adjustment costs for the underlying resource [8]; [4]; [14], which varies in accordance with the time horizon, contractual and institutional arrangements, and technological constraints. Banker and Byzalov [14] also ask, whether firms that face greater demand uncertainty tend to possess a less rigid cost structure with lower fixed and higher variable costs, or a more rigid cost structure with higher fixed and lower variable costs. Their results, which are based on less formal analysis of the issue, are contrary to commonly held opinions.

For example, Balakrishnan et al. [17] explain that a cost structure with little operating leverage (a low proportion of fixed costs) offers companies flexibility because it involves few upfront cost commitments (only a few fixed costs). Companies confronting uncertain and fluctuating demand conditions are likely to opt for this flexibility. Kallapur and Eldenburg [18], who focus on contribution margin uncertainty, argue that because the value of flexibility increases with uncertainty, technologies with numerous variable and few fixed costs become more attractive as uncertainty increases. Such conventional wisdom is also pervasive among industry practitioners.

The traditional approach to cost behaviour postulates that the cost of activities change proportionately with the volume of activity and that the considered cost is fixed or variable, which assumes that variable costs are directly altered in adherence with alteration in the activity driver. Furthermore, there exist some forms of costs that may be classified as variable or fixed costs with huge difficulties, as they behave differently in different situations. A prominent example is logistics costs. Krajnc, Logožar and Korošec [19] designed a model for activity-based accounting of logistics costs, in which they divide logistics activities into four

subsystems: purchasing, internal, sales and after-sales logistics. This model lends clarity to logistics costs, but fails to solve the issue of logistics cost variability, which has yet to be widely researched. Furthermore, the concept and the application of the Activity-Based model for logistics cost accounting in a manufacturing company presented in the paper of Furthermore, Krajnc et al. [19] show that such a model can disclose far more indirect logistics costs at the level of a group of products than the traditional costing approach. In addition, it provides more accurate information on these costs at the level of individual products.

In contrast, cost accounting and management are associated with asymmetric costs. Recent research has documented an asymmetric response to increase in cost or decrease in activity (see, for example [20]; [21]; [22]). “Asymmetric cost” is a phenomenon in which the response to decline in cost is either less or greater than a response to the rising costs of an operation. Such cost behaviour is referred to as rigid or fast-moving. [23] For instance, Grolms [24] discusses this issue, describing the concept of “Kostenremanenz” in Germany, and states that this problem appeared in the first half of the 20th century. The importance of this issue is also the subject of a study by Japanese authors Pichetkun and Panmanee, [25], who utilized regression analysis for the behaviour of costs and their explanation of the causes of sticky costs. And as Weiss [26] highlights, results indicate that firms with stickier cost behaviour have less accurate analysts’ earnings forecasts than firms with less sticky cost behaviour.

The issue of sticky cost is engaged in detail for example by Balakrishnan et al. [27] in their publications. Another view on the issue of sticky costs outlines for example Uy [28], who incidentally refers to the authors, which exclude the existence of sticky cost. According to him, literature notes that the cost may not be linear and proportional to the level of activity.

Another study was presented by Bugeja, Lu & Shan [29]. This study gave empirical evidence on cost stickiness based on a large sample of listed Australian firms from the years 1990–2010. They found that cost behaviour in these firms was sticky on average, but with a lesser degree of stickiness than those in the United States. Costs increased by 0.885% in conjunction with a 1% rise in sales revenue, but dropped by only 0.797% in line with a 1% decrease in sales. The degree of cost stickiness demonstrated a ‘U’ shape over the period, rising after International Financial Reporting Standards had been adopted. Nevertheless, sticky cost behaviour was not evidenced in businesses devoted to natural resources, construction and retail. It is interesting to note that the degree of cost stickiness in Australia increased in parallel with the volume of assets and employees at a company, and when managers experienced strong incentives to avoid losses or diminished earnings. However, this phenomenon was less pronounced when revenues declined in the preceding period or in firms with strong governance mechanisms. [29]

It is interesting to point out something of a contrast. Anderson et al. [20]; [30], whose studies introduced the concept of cost stickiness, explained their choice of

measurement that lacked large datasets on activity levels and total costs, while Anderson and Lanen [21] warned that changes in sales do not express an exogenous regressor; this is because sales are not only dependent on volume, but also prices that are set by management. Furthermore, they highlight that classifying costs is subject to managerial choice, and that selling, general, and administrative costs (hereafter “SG&A”) represent merely 30% of total cost. Consequently, these create measurement problems when investigating cost behaviour.

Something similar was also presented by Abu-Serdaneh [23] in his study, when he discovered anti-sticky cost behaviour for the costs of goods sold and selling expenses, while the cost behaviour for SG&A and administration costs was found to be symmetrical, exhibiting neither stickiness nor anti-stickiness. The CGS model shows an increased degree of stickiness for companies with high asset intensity, whereas a lesser degree of stickiness was discerned for free cash flow. Additionally, reduced stickiness was recorded for growth in a period of decline in GDP (a pessimistic period), as demonstrated in the case of Jordan. Nevertheless, the selling expenses model shows a high degree of stickiness for free cash flow, while a lesser degree of stickiness is found for debt intensity.

Research by Yasukata and Kajiwara [31] revealed that difference in cost stickiness is even more pronounced when managers are optimistic about future sales, even when sales decline; hence the reason to keep slack resources for future use. When analyzing the level of individual stickiness between SG&A costs and the costs of goods sold (hereafter “COGS”), they found that SG&A costs were stickier than those for COGS. Under such circumstances, management is reluctant to cut any administrative costs or downsize costs generated by sales personnel, as there is an expectation of needing to raise the numbers of the sales personnel again once levels of sales are restored to normal.

In connection with this issue, Chen et al. [32]; [33] discerned that SG&A costs increased by 0.8% when sales increased by 1%, whereas SG&A costs decreased by 0.74% per 1% decrease in sales under circumstances where managerial staff are less confident, and further decrease by 0.61% under circumstances of a manager being overconfident. Thus, an overconfident manager is less willing to cut resources when sales reduce due to a perception that sales shall pick up again in the near future. Said authors differentiated the sticky cost behaviour beyond managerial agency theory and the economic behaviour of cost accounting. They argued that, for agency theory, stickiness cost behaviour arises through executives adopting traits of opportunity-seeking behaviour. However, an overconfident executive does not seek any personal benefit, but is driven by self-esteem about a positive outcome in the future, which is why such an individual maintains unutilized resources to increase the future value of the firm.

Directly contrary to the studies mentioned above, Via and Peregro [34] presented a paper that investigated whether cost stickiness occurred in small and medium sized companies, using a sample of Italian listed and unlisted firms during the period 1999–2008. Their

findings show that cost stickiness only emerges for the total cost of labour and not for SG&A costs, the cost of goods sold and operating costs. Stickiness of operating costs is only detected in a sample of listed companies.

These and other studies clearly demonstrate the need to explore, make comparisons and verify this issue, also as it pertains to manufacturing firms in the Czech Republic.

### 3. METHODOLOGY

This part presents the final research results found in accordance with the goals of this paper. In order to achieve this, complex quantitative research was conducted that focused on the issue of cost management and cost behaviour in manufacturing enterprises. This was performed from the perspective of cost variability, as well as cost projection into managerial accounting systems and calculating systems within the given enterprises, which were all classified as manufacturing industries according to the CZ-NACE sectoral specifications, sections 10 - 33 (manufacturing activity). In terms of size, microenterprises have been excluded from the sample because they do not often have enough time for any cost management and therefore the results of these business units could distort the overall view of the examined issue. Indeed, almost 1000 randomly chosen companies were addressed, out of which there were 142 respondents, i.e. a 14% return rate.

Prior to this, as a consequence of some preparations, the questionnaire had been modified to eliminate some shortcomings in obtaining responses from respondents. Furthermore, comments from companies at the initial pre-research stage were taken into consideration when editing the questionnaire. Consequently, some questions were amended to add detail or were conversely simplified so as to obtain the relevant data for statistical evaluation. The survey was divided into four basic areas that met the goals and hypotheses of this research project. These were as follows:

**a) main general facts about the enterprise** - many assumptions about cost behaviour are related to the basic aspect of the company's operation prevailing.

- Industry activity - different cost behaviour can be observed eg. in the automotive sector and others in the food industry;
- Nature of production - the cost management experience has verified that the nature of the production can also influence the behaviour of costs;
- Unique or standardized products - products with unique or specific manufacturing process will consume more overheads than standardized products;
- Other specifics - company size by number of employees and turnover, the ownership structure)

**b) main information about costs** - e.g. as relates to cost structure, according to their classification, frequency of monitoring and evaluation, share of overheads and fixed costs in total costs, whether at the cost management, attention is paid primarily to variable or fixed costs etc.);

**c) detailed cost monitoring and projection of costs to costing systems** – eg. which costing methods were used, how overhead costs were reflected in calculation formulas, which calculation formula was used, how the

overheads are most often assigned to the cost object etc.);

**d) the issue of cost behaviour** – in this area it was examined:

- whether firms were aware or considered that costs might not be dependent on production capacity only,
- whether there existed detailed monitoring and management of overheads in firms,
- how the firms managed overheads in relation to various factors (eg. number of customers, production batches, orders, etc.),
- firm's approach to manage the semi-fixed or semi-variable costs,
- whether firms were aware of and observed the so-called sticky cost., etc.

Based on the goals of the paper, the following main hypotheses were arrived at regarding this part of result evaluation:

Ha: There exist significant differences between company size and the amount of attention paid to managing variable and fixed costs. In this hypothesis, the author assumes that with the growing size of the companies will be paid more attention to fixed (overhead) costs because of their higher cost volume and more difficult activity and cost structure.

Hb: There exist significant differences between company size and consideration given to evaluating cost variability according to other parameters than only production volume. In this hypothesis, it is again assumed that larger companies will use more sophisticated tools to cost management and will consider more factors than just the cost dependency on the standard factor – production volume.

In relation to the second hypotheses, discussion is entered into on the difficulty of properly managing logistics costs, in addition to detailing several advantages of outsourcing logistics for cost variability management. This especially involves the issue of proper differentiation of cost variability, which negatively impacts the potential to precisely manage such costs. The close of the results section gives a brief comparative overview on the subject of outsourcing logistics by Czech and other manufacturing companies, and its influence on logistics cost management.

For the evaluation of the formulated hypotheses, descriptive statistics tools (Absolute Frequency, Relative Frequency (%), Simple Sort Method, PivotTables) were used. The results obtained from the questionnaires were evaluated by relative frequency, and the hypotheses were tested by applying good match tests. The selection of enterprises is greater than 100, so we can use  $\chi^2$  tests to evaluate the formulated hypotheses. [35] With regard to the Likert scale was not used in the questionnaire, regression or logistic analysis, or more advanced statistical methods such as SEM, could not be used. The associations in contingency tables were analysed by Pearson statistics for count data.

The authors arrived at this test statistic (1):

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^z \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad (1)$$

The measure of dependence is Pearson's contingency coefficient, wherein P-value is compared with a usual 5% confidence level, a P-value lower than the confidence level leads to rejection of the null hypothesis, and there is no association between variables in the case of null claims. Calculations were performed by statistical packages of MS Excel and XL Statistics. Additionally, tools for descriptive statistics were utilized, such as percentages and averages.

This standard research model was applied to an anticipated number of respondents (about 150), when only 57 respondents were examined and surveyed as a pre-test. The eventual sample of 142 respondents to the main body of research could be considered sufficient for statistical verification.

### 3.1 Sample analysis

The questionnaire was distributed in the year 2015 following the pre-test of this questionnaire in 2014. The aim of the questionnaire was to find out what is the level of cost management in enterprises and in particular, how enterprises work with costs in terms of their behavior and variability. This means, how enterprises differentiated between variable and fixed costs and whether they paid more attention to monitoring, evaluating and managing overheads. The partial objective was also to find out whether companies were managing overhead costs in a traditional way or if they used wider and more sophisticated approaches to cost management to a greater extent.

The questionnaire was divided into four sections with a total of 40 questions (including formal ones), and for this article a total of 12 questions were used for the evaluation. Depending on the nature of the questions, it was possible most frequently to choose the only one answer, for some questions, such as the cost structure, and then it was possible to select the percentage range for each cost groups. Questions like "Specify the share of overheads in total costs" were then conceived as open and respondents had the opportunity to write the exact percentage of this share. This also applied to the following questions: "Which factors affect the costs most often in your business?"; or "Which cost groups show signs of behavior known as Sticky costs?"

The selected sample of businesses (1,000) from the "Albertina" database was implemented using the mathematical function "Randbetween", which randomly assigned the order of business. Albertina is a database of companies operating in the Czech Republic, from which specific selections can be obtained on the basis of selected criteria where the selection of companies was limited to CZ-NACE sectors as manufacturing industries according - sections 10 - 33 (manufacturing activity). And as was written above, in terms of size, microenterprises have been excluded from the sample. For many companies of this choice, there were no active contacts and they could not be therefore addressed, so the sample was limited to the subjects for which the contact was mentioned and was thus able to address them. In total, it was about 300 thousand of manufacturing companies.

Subsequently, the selected enterprises were contacted by email and also by phone asking for a questionnaire to be filled in, both the written and the electronic version. Of the 1000 enterprises we received feedback from 142 respondents (return 14.2%), which fulfills the condition for the use of  $\chi^2$  test tools and the sample can be considered statistically representative in view of the size of the business environment in the Czech Republic.

Regarding the goals and hypotheses of the study, it was essential to evaluate enterprises from the following perspectives – sector structure, size (mainly by the number of employees), ownership structure and type of production.

**Table 1. The structure of respondents by industrial sector**

Manufacture of:	Abs. freq.	Rel. freq.
structural metal products	25	18%
machinery, equipment, vehicles	23	16%
rubber and plastic products	19	13%
treatment and coating of metals	9	6%
food products and soft drinks and bakery	9	6%
cutlery, tools and general hardware	8	6%
furniture	8	6%
electronic, computers and consumer electronics	6	4%
other	35	25%

Table 1 illustrates the sectoral structure of enterprises. As is evident, the largest portion of enterprises were from the sector of manufacture of structural metal products (18%), as well as machinery, equipment and vehicles (16%) and production of rubber and plastic products (13%). Companies in these three areas thus constituted approximately half of all respondents. Other companies came from sectors involved in, for example, food industry, furniture and electronics.

**Table 2. Company size according to the number of employees**

Number of employees	Abs.freq.	Rel. freq.
10 – 49 (Small enterprise)	67	47.2%
50 – 249 (Medium enterprise)	39	27.5%
250 + (Large enterprise)	36	25.4%

In Table 2 we can find the structure of respondents in view of their size (in accordance with Commission Regulation ES no. 800/2008) for which the key criterion was the number of employees. It was obvious (from Table 2) that about 75% of enterprises were ranked as small or medium sized enterprises (SME – up to 250 employees), with almost half of all companies (46.4%) classified as small enterprises. Otherwise, approximately 25% of the firms were classed as large.

Another important aspect was that of company ownership, as various dependences might occur as a consequence. The factor of whether the business was owned by a domestic or foreign shareholder could prove rather important in post-communist economies. The sample showed that domestic ownership dominated, as it was recorded for 78% of respondents while the remainder, 22%, were foreign owned.

The type of production also proves relevant for the purpose of further examination and conclusion. It is possible to seek connections between cost behaviour and particular forms of production. For example, it can be assumed that if the production process runs fluently, it is going to consume less overhead cost. In contrast, for single piece production it is probable that a range of support operations, activities and processes could exist that would increase consumption of overheads. Table 3 shows such classification.

**Table 3. Structure of companies by the predominant type of production**

Type of production	Abs.freq.	Rel. freq.
Single piece production	23	16.2%
Project production	22	15.5%
Small batch production	29	20.4%
Large batch production	38	26.8%
Mass production	9	6.3%
Other*	21	14.8%

\* includes companies for which there is no predominant type of production

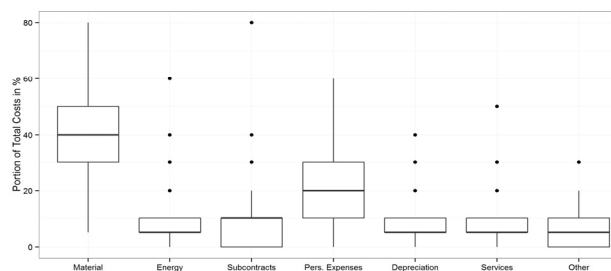
As can be seen in Table 3, the numbers for particular types of production are quite well balanced; no particular type of production predominates.

#### 4. RESULTS

Some of the main research results are given in this section. Firstly, the main cost structure of enterprises was analyzed.

For the sake of arriving at a research solution and evaluating cost management, it is necessary to discern the structure of costs from the perspective of their classification.

It is possible to consider elemental cost classification by type as a traditional methodology. The following image (Figure 1) shows a box plot of mutual allocation of total costs in the investigated enterprises. The prospect existed to depict the proportion of the range of 0-100% in 5% units).



**Figure 1. Basic cost groups according to generic structure - portion of total costs**

It is evident (from Figure 1) that materials account for the largest proportion of total cost, as is anticipated for manufacturers. The mean value is at about 40%, with the upper quartile at +10% and lower quartile at -10%.

The second significant cost group comprises personnel expenses, the median value equaling about 20% and the upper and lower quartile at + or - 10%. The other cost groups are then at approximately the same level, and are considered less important in value than material and personnel expenses.

Another perspective on cost classification is offered by the relationship between costs and production volume. Table 4 below displays differences between overhead and fixed cost portions.

**Table 4 Average Overhead and Fixed cost portion of total cost**

Cost types	Portion of total cost
Unit cost	67%
Overheads	33%
Cost types	Portion of total cost
Variable cost	79%
Fixed cost	21%

Table 4 illustrates that the average portion of overhead costs stands at about 33%. This percentage can be compared with prior research, when a sample of approximately one hundred manufacturing companies were examined. It was found that the portion of overhead costs was about 39% in 2009, then 41% in 2007, and finally about 35% in 2004 [36]. There is a notable disproportion between average overheads and the fixed cost portion, when the latter equals merely 21% (against 33% of overheads).

**Table 5 Relationship between entity size and volume of overheads and fixed costs**

% range	0-20		21-40		41-60		61-80		81-100	
Entity size	O	FC	O	FC	O	FC	O	FC	O	FC
Small	21	46	30	18	11	3	5	0	0	0
Medium	9	27	24	9	3	2	2	2	1	0
Large	9	23	16	12	10	1	1	0	0	0
Total (number of entities)	39	96	70	39	24	6	8	2	1	0
	O	FC								
Median	30%		20%							
Std.deviation	16.4		11.99							

It is apparent from Table 5 that most respondents stated their proportion of overheads to range between 20-40%, while the median is 30%. This range was stated by 45% of small firms, 61% of medium-sized firms and 44% of large firms. Furthermore, it is evident that almost 70% of all companies (96 of 142) indicated their fixed costs to equal less than 20%, which is true for the whole sample (even the median of fixed costs is at the value of 20%).

Due to responses to other questions, and contrary to initial expectation, it is evident that companies do not pay special attention to overhead costs. The respondents mentioned in about 60% of cases that they are as concerned with overhead cost management as with variable cost management. The percentage of 20% of respondents mentioned that they focus primarily on variable (unit) costs. Only 3.5% of respondents specified that they concentrate solely on fixed cost management.

Finally, 13% of respondents commented that they tend to highlight the detailed division of costs after splitting them into particular categories. It is necessary to point out that in specific situations the above-mentioned results can be negatively impacted by the issue of unclear differentiation between fixed and variable costs.

This problem is most apparent in instances of logistics costs experienced by manufacturing compa-

nies, arising due to the complicated and vague structure of the former. In most cases, logistics costs are understood as being variable ones. However, there are many factors affecting logistics costs, which might make them fully independent of production volume, especially if all logistics services are handled in-house. Some logistics costs are more easily managed by taking advantage of outsourcing services or inventory consignment. For example, holding costs are frequently considered variable costs, but under circumstances of a firm utilizing its own internal storage capacities, holding costs might not be strictly variable, this is because said company also has to pay for unutilized space. A different situation concerns outsourcing warehousing facilities, where a company pays directly per individual stored unit.

In order to obtain a general view on the issue of cost management, it is worthy of note that only about 6% of firms do not use costing for their cost management. Otherwise, companies apply full absorption costing in half of the given cases. In comparison with previous studies, an aspect of interest is use of the modern methodology of Activity-Based Costing, which is recorded for approximately 8% of the cases. Another point worth mentioning is that the costing methods are based less on historical dates (in 44% of cases) than they are oriented to planned values (in 56% of cases).

As proof of these findings, the authors can state there is a minimum of possible cost management that is based on other cost drivers than production capacity. This was also confirmed by other responses from respondents, when 80% of these mentioned that they were aware that cost variability may also be considered as relating to other quantities than just production capacity, but no more than 24% of respondents apply this knowledge actively in cost management. 20% of respondents even noted that they had never heard of this issue.

This was supported by other findings, when half of the companies mentioned that they do not distinguish between semi-fixed or semi-variable costs. About 25% of respondents had never heard of these. This means that only the remainder, 25% of respondents, discerned differences between the categories of these semi-costs (half of said respondents were large enterprises).

Next, a thorough investigation was carried out in order to confirm whether a strong dependence existed between overhead cost management and company size. Comparisons were made between the frequency and expected frequency of the variables “*company size*” and “*attention paid to management of variable and fixed costs*”.

**Table 6 Statistical correlation between company size and attention paid to cost control**

Frequency due to enterprise size	Attention primarily on variable costs		Attention equally on variable and fixed costs		Detailed breakdown of costs to the level of cost centers	
	real freq.	expected freq.	real freq.	expected freq.	real freq.	expected freq.
Small	25	14.674	31	34.572	6	12.753
Medium	3	9.230	27.5	21.747	8,5	8.022
Large	3.8	7.929	16.5	18.680	13.2	6.891

Referring to (1), based on the calculated characteristic of  $\chi^2 = 25.1 > \chi^2 \text{ crit.} = 9.5$  and the corresponding P-value  $< 0.01$ , it was evident that the null hypothesis “*Ha of independence*” had to be rejected. The author can confirm that there were significant differences between company size and the amount paid to the level of managing variable and fixed costs. It may be concluded from detailed analysis of dependencies (see Table 6) that companies do not pay special attention to variable or fixed cost management - the answer “*We primarily focus on fixed cost (overheads) management*” was only chosen at a statistically insignificant frequency, hence it was omitted from statistical evaluation. Additionally, it is apparent from a comparison of real and anticipated frequency for the answer “*we primarily focus on variable cost*” that especially medium and large enterprises do not actually do so. In contrast, for small enterprises, such dependence is much higher as this possible answer was given more often than anticipated. Despite this, it is obvious that medium and large enterprises actually concentrate more on managing both fixed and variable costs, as well as breaking down costs to the level of individual cost centres, this happening concurrently with expansion of the given enterprises.

Nevertheless, this does not mean that the companies wish to ignore overhead cost management altogether. This fact was also borne out by the other hypothesis (Hb), which had to be verified as well for the purpose of being tested on statistical dependence, resulting in  $\chi^2 = 16.7 > \chi^2 \text{ crit.} = 9.5$  and the corresponding P-value  $< 0.01$ .

**Table 7 Statistical correlation between company size and awareness of the assess the cost variability to other factors than only the volume of production**

Frequency due enterprise size	Yes, and it is actively used in practice		Yes, but it is not used in practice		Previously unaware of the issue	
	real freq.	expected freq.	real freq.	expected freq.	real freq.	expected freq.
Small	11	16.042	34	38.218	22	12.739
Medium	12	9.338	24	22.246	3	7.415
Large	11	8.62	23	20.535	2	6.845

Again it may be concluded from detailed analysis of dependencies (see Table 7) that alongside increase in size of the company is a rise in awareness (and actual use) of costs that depend on factors other than production volume. A statistically significant dependence was thus confirmed between company size and the cost variability assessment conducted by cost drivers other than merely production volume.

In relation to the aspects of costs described above, which can be assessed from the perspective of cost variability? In answer to this, a conclusion to draw from this detailed examination relates to ever greater awareness and usage of alternative cost drivers alongside ongoing expansion of a company, although in some cases it is nigh on impossible to classify costs as either fixed or variable.

In light of logistics costs representing a highly problematic issue in the aforementioned context, it is an option to drive them more precisely in production companies by using outsourced logistics services in some areas. The chances are that increasing production volume would trigger a rise in variable logistics costs in



most logistical areas (warehousing, transportation, packing etc.).

However, if a firm utilizes its own logistics services, this may not always be true, and they might often face the problem of unutilized capacities, causing higher unit costs than expected. This has been proven for the following examples:

- a) Transporting final products via in-house transportation facilities could generate different costs in different situations, based on vehicle utilization. Costs are calculated per number of kilometers travelled, regardless of the amount of transported units.
- b) Purchase planning problems might trigger higher material costs due to the occurrence of urgent deliveries or unsalable stocks (the costs of which influence the whole costing structure).
- c) Direct labour costs in logistics seemingly increase and decrease in parallel with production volumes. However, in reality, implementing some improvements into areas that generate direct labour costs facilitates greater productivity without the necessity for a rise in direct labour costs. Alternatively, in contrast, reducing production volume might not always bring about decrease in direct labour costs.

However, outsourced services are usually simple to link to volume of production, so can be considered variable costs beyond any doubt.

In the Czech Republic, outsourcing logistics services is something that large companies tend to do. In total, approximately 82% of Czech manufacturers outsource at least one logistical activity. Frequently, these include transportation, warehousing and fleet management [37]. In comparison to other nations, the proportion of outsourced logistical activities differs slightly. While in the Czech Republic there is a huge gap between outsourcing in transportation (55%) and other outsourced services (less than 15% for all other types of costs), results obtained in other categories are significantly higher elsewhere in the world, according to the latest study by Capgemini [38]. A very similar situation is apparent for consignment services, which tend to be used relatively rarely in the Czech business environment, in comparison to other nations. While they do not exert such a strong influence on logistics cost variability as logistics outsourcing, they also have the capability of reducing such cost invariability in some cases (reducing opportunity costs, greater utilization of warehouse space, and so on).

Although logistics costs could represent up to 25% of total company costs, their cost management is actually quite vague. This was also recorded in a past study involving examination of the main reasons for outsourcing logistics [37]. Although cost reduction was stated as being one of the three most important incentives for outsourcing logistics by respondents, nobody mentioned better cost management or eliminating unutilized logistics facilities as a reason for outsourcing logistics services. Additionally, no significant relation exists between the explanations given for outsourcing logistics and outsourcing individual activities.

## 5. DISCUSSION AND CONCLUSION

The results confirm that the share of overheads is still relatively high for manufacturing companies, although it has decreased in comparison with figures from previous surveys (33% in 2015, 38% in 2014, 39.5% in 2009). A finding of note was the disproportion between the level of overheads and fixed costs. This is caused by the potential to incorporate within variable costs a proportion of overhead costs from production. This is also consistent with the fact that respondents set aside, under general cost classification, the average portion of technological energy costs - approximately 9% of total costs.

A positive aspect of the findings is that companies are aware of the importance and significance of cost management, as well as detailed monitoring and overhead cost management. This was stated by almost 80% of the businesses studied (85% in pre-test research in 2014). Still, it is not possible to declare that companies pay more attention to analyses and overhead cost management than to variable cost management. On the contrary, companies either currently tend to control both variable and fixed costs equally, or even primarily concentrate on analyzing and managing variable costs. This is certainly attributable to the fact that there is an economic recovery underway alongside a progressive ramp up in production levels, under which circumstances such companies primarily deal with rising variable costs.

Based on the above information, it was deemed that a more thorough investigation would be carried out, in order to discern potential connections between various aspects of the companies. Firstly, the authors assumed there was a strong dependence between overhead cost management and company size. Additionally, based on hypothesis "Ha", research confirmed the importance of the association between company size and the amount of attention paid to managing particular cost groups. Logically, a larger company is likely to have a more complex system of costs, so will have to give more consideration to overhead cost management, primarily as this area exhibits the potential to save costs for almost any company.

Comparing results with those from the pre-test, there is a necessity to point out an indication that was detected. This refers to applying detailed cost analyses that would monitor cost behavior within the companies from other perspectives than solely that of production capacity. Nevertheless, in practice only approximately a quarter of firms do this actively. The firms highlighted the number of orders (in 13% of cases) or amount of batches (in 14% of cases) as another cost drivers utilized in the context of assessing cost variability (multiple-choice options were given). Despite these positive signs, the standard view still dominates that cost variability solely relates to volume of production and sales.

A future study is required to work out why the above-mentioned circumstances occur, with endeavor focused on carrying out further qualitative research. However, one reason can be given at this time. Findings have proven that there is minimal awareness of



asymmetric cost behavior. Almost 65% of respondents (senior executives at the companies were addressed) are not aware of the fact regarding asymmetric cost behavior or the influence of other factors than production capacity only.

In conclusion, even though many authors have discussed the issue of cost management, there is still a great need to tackle reactions and attitudes towards changes in the current economic environment. It is important to provide companies with possibilities regarding problem solving in relation to planning and cost prediction, as a consequence of which they can achieve greater economic efficiency.

Although the situation in cost management and assessment is improving, conservative approaches still exist to cost management in manufacturing firms, and the majority of firms maintain adherence to historically rooted models of cost management. However, many manufacturers admit that changes to cost management are unavoidable for numerous reasons.

One of the most important is the issue of fixed and variable costs, and that of clearly defining them. This is especially true for logistics, which generates around 25% of total costs; hence, this problem arises frequently.

However, Czech manufacturers are beginning to specialize much more than in the past, which can also benefit them in cost management. Moving several non-core activities to external partners (outsourcing) helps them to manage costs more efficiently. Outsourcing services could result in reducing the number of issues associated with many types of invariable costs, especially logistics.

Although it seems that growth in overhead cost portions has ceased, it remains a necessity to monitor them more closely, conduct detailed analyses, and search for various opportunities to make savings. It is worth noting that monitoring and evaluating overheads are factors reflected in costing methods, the latter then providing a more complete overview on allocating these costs on the basis of relevant relational quantities.

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**СХВАТАЊА ТРОШКОВНОГ ПОНАШАЊА У  
ИНДУСТРИЈСКИМ ПРЕДУЗЕЊИМА  
С ОСВРТОМ НА ЛОГИСТИКУ И ЊЕНЕ  
ТРОШКОВЕ**

**П. Новак, Д. Хрушецка, Ј. Маџурова**

Рад приказује резултате квантитативног истраживања, као дела великог пројекта, о варијабилности трошкова и систему управљања трошковима. Циљ истраживања је била анализа налаза добијених дефинисањем схватања трошковног понашања у пракси индустријских предузећа. Пажња је усмерена на изабрану групу трошкова, посебно трошкова логистике. Приказани су резултати верификовани статистичким испитивањем релација зависности. Утврђено је да постоје значајни недостаци код производних предузећа и да предузећа имају резерве у погледу управљања режијским трошковима. Осим тога, удео режијских трошкова је и даље релативно велики. Потврђена је мала разлика између величине предузећа и напора који се улажу у управљање фиксним и варијабилним трошковима. Старији припадници извршне власти су неинформисани о асиметричном трошковном понашању или о утицају фактора ван производних капацитета. Трошкови логистике су одређени са аспекта проблема трошковног понашања. У завршном делу рада разматрају се најважнији резултати истраживања.