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Is It Sufficient to Assess Cost Behavior Merely by Volume of Production? Cost behavior research results from Czech Republic

PETR NOVÁK¹, and ONDŘEJ VENCÁLEK²

¹ Department of Enterprise Economics, Faculty of Management and Economics Tomas Bata University in Zlín, Czech Republic

² Department of Mathematical Analysis and Applications of Mathematics, Faculty of Science, Palacký University, Olomouc, Czech Republic

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ABSTRACT

This paper presents results from quantitative research performed as part of a project on cost variability and cost management systems. The main goal was to analyze principal findings that arise through seeking to determine levels of cost management, as well as from comprehending various types of cost behavior affecting manufacturing enterprises in the Czech Republic. The first part summarizes contemporary theories on approaches to cost management that place emphasis on overhead cost management and general and asymmetric cost behavior. The second section deals with the procedure and methodology of the research conducted. Moreover, presentation is given of surveyed questions and hypotheses that form the basis for analysis of particular areas within cost management. The subsequent part presents actual results from research verified through statistically inspecting dependence relations. It was found that the share of overheads was still relatively high, although it had decreased in comparison with figures from previous surveys. Furthermore, there was evidence of significant association between the size of a company and the attention paid to a broadened perception of cost behavior and to monitoring the same. In addition, it was confirmed that senior executives were not aware of issues regarding asymmetric cost behavior or the influence of factors beyond production capacity. It was proven that a dependence exists between the prevalent type of production and complications arising in research, e.g. utilization of the ABC method or monitoring semi-fixed and semi-variable costs. These findings are discussed in the final part of the paper.

INTRODUCTION

In recent decades, changes in the business environment have exerted a significant impact on the structure of company costs. Consequently, one can observe how cost management and cost management systems have continually gained in importance. Indeed, the ability to analyze

enterprise costs is a key prerequisite for effective cost management, and represents a primary factor in the performance of an enterprise. A principal feature of cost analysis is cost classification, where costs are assigned under defined categories according to their particular characteristics. Hence, a related area of note is cost behavior analysis, as the behavior of costs and development of the same are influenced by numerous factors.

Due to stiff competition in global markets, enterprises require detailed and precise information on cost efficiencies and the profitability of products, projects or customers (Travkina and Tvaronavičienė, 2015; Tvaronavičienė et al., 2015; Tvaronavičienė, 2016). All such issues necessitate a greater understanding of the costs consumed by different activities, in addition to other areas where costs play an important role. It is worth noting that standard and traditional assessment of cost behavior, gauged merely by volume of production or sales, would not seem up to the job of meeting the current needs of (manufacturing) enterprises.

Managers are interested in estimating past cost behavior patterns, since this information can expedite more accurate cost predictions concerning planning and decision-making (Pichetkun and Panmanee, 2012). Therefore, an understanding of cost behavior is critical for managers and accountants to ensure that data are provided and utilized in order to make effective decisions (Maher, Stickney, and Weil, 2008). From a management perspective, it is necessary to know how costs behave in order to make informed decisions on products, as well as for the purposes of planning and evaluating performance (Lanen, Shannon, and Maher, 2011). Knowing how change in activity output affects costs is an essential part of planning, control, and decision-making processes (Hansen 2009). In fact, ignorance of cost behavior can force errors in judgment, from minor to major in scope. This is why there is a constant narrative on the variability of costs and how they translate into costing systems, resulting in the eventual price of a product.

The main *objective of this paper* was to analyze and present findings amassed from quantitative research conducted within a project entitled “Variability of cost groups and its projection in the costing systems of manufacturing enterprises”, and discern whether it was sufficient for enterprises to assess cost behavior merely by volume of production. A *further aspect* was to analyze the present state of cost management as applied by manufacturing enterprises in the Czech Republic. Informing this were particular results stemming from a survey, in the form of a questionnaire, with the emphasis on overhead cost management in manufacturing enterprises as well as perception of potential asymmetric cost behavior. Primarily, analysis was made of managerial approaches to overheads in addition to their dependence on different factors.

1. THEORETICAL BACKGROUND

Knowing how costs change as activity output changes is an essential part of planning, controlling, and decision making. (Hansen, 2009) Ways to proceed with the assessment of costs and their analysis are numerous. The financial and management accounting methodologies adopted by the various nations of the world usually take different approaches to cost classification. Financial accounting uses a method of cost classification in financial statements. Such classification sorts natural types of costs by the form of the input consumed. However, in managerial accounting, the term cost is applied in numerous ways. There are all sorts of costs, and these are classified differently according to the immediate needs of management, e.g. in order to prepare external financial reports, to inform decision-making, and so on (Garrison, 2010).

Selecting one author as an example, Drury (2012) states the main division as being one that designates direct and indirect costs. Direct costs primarily comprise direct materials and labor, representing those easily and accurately identified with a particular cost object. Therefore, indirect costs cannot be determined specifically and exclusively with a given cost object.

(Drury, 2012; Hansen and Mowen, 2015). 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. (2005), such difficulties consequently triggering contemporary trends to reduce such overhead costs or make cuts, as concisely summarized by Willeman (2008). Indeed, Hansen et al. (2009) 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 (Sharman, 2003). Knowledge of cost behavior is very important, especially for decision-making. As Banker and Byzalov (2014) stated, understanding cost behavior is a fundamental issue in cost accounting. For each decision taken, the management of a company requires estimates of costs and revenues at different levels of activity for alternative courses of action. Meanwhile the behavior of the costs and any subsequent decision depends on the cost driver. This also highlights Rajnoha (2011) or Dejnega (2010), adding that for detailed cost management could be further also use methods such as Activity Based Costing, Time-driven Activity Based Costing, Target Costing, Kaizen Costing and many others, which are based on the detailed calculations and cost allocations according to cost activities and processes. For instance, Popesko goes even further and states that criticism of standard, traditional cost models is also evident in other areas of cost management, e.g. in budgeting. Such denunciation resulted in new methods being introduced, such as *activity-based budgeting* and *beyond budgeting*. (Popesko, 2016) These conclusions are additionally based on other surveys presented by Popesko et al. (2015).

A traditional model of cost behavior 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. (Hilton, Maher, & Selto, 2008) Another business models deals with the issue of direct and indirect costs. For instance, Slávik and Bednár (2014) evaluated the impacts of various capturing techniques for direct and indirect costs in such models. In practice, it is necessary to distinguish between these sets of costs. Indeed, the narrative can be about purely variable costs, as well as completely fixed, semi-variable and semi-fixed ones (Drury, 2012).

As Banker and Byzalov (2014) state, understanding cost behavior is a fundamental 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, Noreen and Soderstrom, 1994; Weil and Maher, 2005; Hansen et al, 2009).

Costs are caused by resources, including both activity resources and physical capital. Cost behavior then reflects resource adjustment in response to activity changes. Some resources,

such as indirect skilled labor, are costly to adjust in the short term so are predisposed to generating fixed costs. (Banker and Byzalov, 2014; Drury, 2012; Hansen et al, 2009) Banker and Byzalov (2014) 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.

The traditional approach to cost behavior 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. 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, Anderson et al., 2003; Anderson et al, 2009; Via and Perego, 2013). "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.

The cost behavior issue is deeply investigated also by authors Banker and Byzalov. One of their study was focused on analytically and empirically investigation of the relationship between demand uncertainty and cost behavior. They argue that with more uncertain demand, unusually high realizations of demand become more likely. Accordingly, firms will choose a higher capacity of fixed inputs when uncertainty increases in order to reduce congestion costs. Higher capacity levels imply a more rigid short-run cost structure with higher fixed and lower variable costs. They formalize this "counterintuitive" argument in a simple analytical model of capacity choice. Evidence strongly supports their hypothesis that firms facing higher demand uncertainty have a more rigid short-run cost structure with higher fixed and lower variable costs. (Banker, Byzalov and Plehn-Dujowich, 2014) Such cost behavior is referred to as rigid or fast-moving (Abu-Serdaneh, 2014).

For instance, Grolms (2011) 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 et al., 2012), who utilized regression analysis for the behavior of costs and their explanation of the causes of sticky costs. And as Weiss (2010) 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 a very detailed for example by Balakrishnan et al. in their publications (e.g. Balakrishnan and Gruca, 2008). Another view on the issue of sticky costs outlines for example Uy (2011), which 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.

It is interesting to point out something of a contrast. Anderson et al. (2003 and 2004), whose study 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 (2007) warned that changes in sales do not express an exogenous repressors; this is because sales are not only dependent on volume, but also prices that are set by management. Furthermore, Anderson and Lanen (2007) 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 behavior.

Something similar was also presented by Abu-serdaneh (2014) in his study, when he discovered anti-sticky cost behavior for the costs of goods sold and selling expenses, while the cost behavior 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.

Cost stickiness becomes a phenomenon of present time. Research by Yasukata and Kajiwara (2011) revealed that the difference in cost stickiness even larger when managers are more optimistic about the 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.

Another survey was performed by Brügggen and Zehnder (2014). They found out and confirmed, that when applying textbook methods that are based on the traditional model of cost behavior, e.g. flexible budgeting or cost-plus pricing, it is necessary to consider that costs do not necessarily behave mechanically, but might be sticky. This results could have important implication for directors on the board of a company and specifically members of the compensation committee. When monitoring the CEO, an increasing SG&A to sales ratio in periods of declining sales does not necessarily provide evidence of inefficient management or empire building. The executive might act in the best interest of the firm and save costs in the long term. As evidenced by the analysis in this study, cost behavior is sensitive to incentives provided to the manager (Brügggen and Zehnder, 2014).

Another survey was presented by UY (2014), when he stated, that competitive advantage is not only measured by the revenues and profits but also by how firms operate efficiently (costs). Recent studies show another dimension to cost behavior pattern, called "sticky cost", which explain how firms are able to adjust their resources with changes in activity-levels due to either temporary market fluctuations or a more permanent demand shift. Using panel data analysis, this study analyzed and confirmed asymmetrical cost behavior of Philippine firms. Furthermore, he stated, that the implications of the degree of stickiness to the ability or inability of firms to respond quickly to changes in the market in particular and to their competitiveness in general are tremendous. In a global economy where political and economic boundaries are disappearing fast, the degree of cost stickiness could influence the long-term survival of firms. Firms should be cognizant of this and adopt and adapt mechanisms which could enable them to react promptly to changes in the market and remain competitive (Uy, 2014).

Directly contrary to the studies mentioned above, Via and Peregro (2014) 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 labor 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

The next sections present 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 behavior in manufacturing enterprises. This was performed from the perspective of cost variability, as well as cost projection into managerial accounting systems and costing systems within the examined enterprises, which were all classified as manufacturing industries. Indeed, almost a thousand randomly chosen companies were addressed, out of which there were about 160 respondents, but 18 of them had to be excluded

because they sent back incomplete or muddled questionnaires. Eventually, 142 respondents remained, which represents 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) general information about the enterprise, b) general information on costs, c) detailed cost monitoring and projection of costs to costing systems, and d) the issue of cost behavior. This paper is primarily concerned with differences between the basic characteristics in the cost behavior of various companies. These can be summed up as:

- enterprise size (the number of employees)
- ownership (domestic / foreign)
- predominant branch of activity (according to CZ-NACE)
- primary form of production

The results obtained from the questionnaires were evaluated by relative frequency, and hypotheses and questions were tested by applying χ^2 tests and Fisher's exact test of independence. The associations in contingency tables were analyzed by Pearson statistics for count data. Fisher's factorial test was given priority due to low frequency in certain cells of the table, rather than utilizing the chi-square test of independence. For tables larger than 2 x 2 a modification to Fisher's exact test was implemented in software *R*. For variables appearing in more than two categories, such as company size, which traverses three categories (small, medium and large), testing always checked whether two "neighboring" categories differed significantly. If the difference was statistically insignificant, these categories were combined.

The measure of dependence is Pearson's contingency coefficient, wherein P-value is compared with a standard 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. This standard research model was applied to an anticipated number of respondents (about 150), when only 57 respondents were examined as a pre-research. The eventual sample of 142 respondents to the main body of research could be considered sufficient for statistical verification. However, it was shown during statistical examination that the statistical sample size of respondents is not fully sufficient and consistent in the more detailed distribution of respondents, hence some points of the survey could not be statistically verified with satisfactory reliability.

Based on the objectives of the project, the following considerations and hypotheses were arrived at for evaluation at this stage: a) Assessing cost variability from the perspective of other relational variables than just production volume depends on the type of production – thus, the concept of cost variability as conceived primarily evaluates enterprises with piece-, project- or small-batch production, b) Applying Activity-Based Costing method takes place more frequently in enterprises with large-batch (or mass) production, c) Might a correlation exist between the variables as size of the firm, detailed monitoring of the structure and the development of overheads? And d) Large firms make greater use of knowledge on semi-fixed and semi-variable costs, which also pertains to enterprises involved in piece (custom) production. Perceiving the fact that there exist cost groups, which go up in expense in the short- and mid-term when production capacity rises, however, these actually remain at the same level and do not drop again when production go down, although larger enterprises are becoming increasing aware of this issue.

4. FUNDAMENTAL CHARACTERISTICS OF RESPONDENTS

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

Table 1 illustrates the structure of respondents regarding their size (according to Commission Regulation (ES) no. 800/2008), for which the key criterion was the number of employees. It was evident (from Table 1) that almost 75% of respondents were ranked as small or medium sized enterprises (SME – up to 250 employees), with almost half of all companies (47.2%) classified as small enterprises. As widely noted also in theory, SME is a major part of the economy, as was also confirmed by many surveys (e.g. Belás et al., 2015; Zapletalová et al., 2015). And Kozubíková et al. (2015) also confirmed that small and medium-sized enterprises play an important role in the economic system of any developed country. Otherwise, approximately 25% of the respondents were classified 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 78.2% of respondents while the remainder, 21.8%, were foreign owned.

Table 1. Enterprises size according to the number of employees

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

Of significance is assessment of foreign ownership in the category of medium and large enterprises, of which almost 35% belonged to foreign owners, whereas the figure for small firms was only 7.5% (see Table 2).

Table 2. Structure of Enterprises according to their size

	<i>Ab.freq.</i>		<i>Rel. freq.</i>	
	<i>Small</i>	<i>Medium and Large</i>	<i>Small</i>	<i>Medium and Large</i>
Domestic	62	49	92.5%	65.3%
Foreign	5	26	7.5%	34.7%
Total	67	75	100%	100%

The type of production also proves relevant for the purpose of further examination and conclusion. It is possible to seek connections between cost behavior 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 piece production it is probable that a range of support operations, activities and processes could exist that would increase consumption of overheads. Therefore, respondents were divided into five groups depending on the prevailing type of production. Table 3 shows such classification.

Table 3. Structure of enterprises by the predominant type of production

<i>Type of production</i>	<i>Abs.freq.</i>	<i>Rel. freq.</i>
1-piece production	25	17.6%
Project production	22	15.5%
Small batch production	34	23.9%
Large batch production	38	26.8%
Mass production	9	6.3%
Other*	14	9.9%

*Note: includes respondents 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. For circa 10% of respondents, the primary form of production was not precisely determined.

Assessing the prevailing type of activity (industry) showed that most enterprises were classified as CZ-NACE under group 25 – the manufacture of fabricated metal products, with machinery and equipment (33.8%) below this. Following on were those pertaining to group 22 – the manufacture of rubber and plastic products (13.6%), and group 28 – the manufacture of machinery and equipment n.e.c. (11.3%). Fewer than ten respondents (less than 6%) related to any other group.

5. RESULTS

Some of the main research results are given in this section. Firstly, it is necessary to specify, in relation to Table 3, that mass production (at 51.4%) predominated in large companies, not in small and medium-sized enterprises (21.5%). This significance was also confirmed by the p-value ($p = 0.002$). For the sake of arriving at a research solution and evaluating cost management, it is also necessary to discern the structure of costs from the perspective of their classification. In order to facilitate basic classification, cost groups can be considered according to their generic structure. From this perspective, materials accounted for the largest proportion of total cost, as was anticipated for manufacturers. The mean value for the given sample was approximately 40%, with the upper quartile at +10% and lower quartile at -10%. The second most important cost group included personnel expenses, the median value equaling about 20% and the upper and lower quartile at +10% or -10%. The other cost groups (e.g. energy, depreciation, subcontracts and services) were then at approximately the same level, and considered less crucial in value than material and personnel costs.

Another angle on cost classification is provided by the relationship between costs and volume of production. Thus, differences between overhead (and unit cost) and fixed (and variable) cost portions may be considered. Initially, it was necessary to discern the average portion of overhead costs, which was found to lay at around 33%. Comparison was possible with previous studies, wherein a sample of approximately one-hundred manufacturing companies were examined. The proportion of overhead costs equaled about 39% in 2009, then 41% in 2007, and finally 35% in 2004 (Novák and Popesko, 2014).

The results highlighted a significant disproportion between average overheads and the fixed-cost portion, the latter merely standing at 21%, as opposed to overheads at 33%. Dividing respondents up according to their proportion of overheads revealed that most respondents stated them to range between 20-40%, while the median was 30%. This range pertained to 45%

of small firms, 61% of medium-sized firms and 44% of large firms. Furthermore, almost 70% of the companies (96 out of 142) indicated fixed costs as equaling less than 20%. Costing can be considered an important tool for cost management. Therefore, it may be considered as relevant for researching the application of costing methods. Herein, analysis showed that most companies (61% of cases) still employed a full-cost allocation method using allocation bases and overhead margins. Meanwhile, costing methods are based less on historical dates (44% of cases) than they are oriented to planned values (56% of cases).

6. USE OF ACTIVITY-BASED COSTING AS A TOOL FOR COST MANAGEMENT ACCORDING TO COST BEHAVIOR

Given the nature of the research and the matter of determining the level of overhead cost management, further detailed examination of *commonplace usage of the Activity-Based Costing method (ABC)* seems relevant.

As a stand-alone costing technique, ABC is actually only used in 6% of cases. In total, in combination with the act of costing traditional overhead rates, it is applied by 7.7% of respondents. Upon closer analysis, it is revealed (see Table 4) that the *ABC method is more often utilized by large enterprises* (p-value = 0.004), the figure standing at 19.4%. However, in medium-sized operations it is 7.7%, whereas it amounts to 1.5% in small businesses. Frequently, it is instigated by companies involved in mass production (21.1%), more usually than by others (3.3%), the significance of which is also confirmed by the p-value (p = 0.003).

Table 4. ABC utilization according the size of enterprise

	<i>Small enterp.</i>		<i>Medium enterp.</i>		<i>Large enterp.</i>	
	<i>Abs. freq.</i>	<i>Rel. freq</i>	<i>Abs. freq.</i>	<i>Rel. freq</i>	<i>Abs. freq.</i>	<i>Rel. freq</i>
YES	1	1.5%	3	7.7%	7	19.4%
NO	66	98.5%	36	92.3%	29	80.6%

Whether this is due to large companies applying ABC analysis frequently, wherein mass production often prevails, is determined when comparing similarly sized companies. Examining the situation in more detail (see Table 5), large companies with mass production operations utilize the ABC method in 33.3% of cases, but it only equals 5.9% if this is not the case. The p-value is 0.088, and is it very close to the significance level of 0.05 (5%). In small and medium-sized enterprises, the ABC method is used in 10% of instances dominated by large-batch production, although only 2.7% if a different type of production is foremost. This difference does not appear to be significant (due to the p-value = 0.201).

Although the variances are insignificant, they are observed for both size groups (large-batch production and other type of production). *Therefore, the assumption can be made that the ABC method is actually instigated more frequently by enterprises primarily involved in large-batch production than in similarly sized companies with other forms of manufacturing processes.*

Table 5. Comparison of ABC utilization relative to the type of production and size of enterprise

	<i>Small and Medium enterp.</i>		<i>Large enterp.</i>	
	<i>Large batch</i>	<i>Other</i>	<i>Large batch</i>	<i>Other</i>
YES	10%	2.7%	33.3%	5.9%
NO	90%	97.3%	66.7%	94.1%

7. COST BEHAVIOR OF SPECIFIC COST GROUPS – DEPENDENCE ON FACTORS OTHER THAN PRODUCTION VOLUME

Another point of view on cost management in manufacturing enterprises concerns the cost behavior of specific cost groups. To this end, interest lies in the level of awareness held by authorized employees on cost behavior related to factors extending beyond merely volume of production. Hence, reference is made to the variability of costs (or variability of cost groups). Here, 24% of respondents stated that knowledge on different assessments of cost variability had been utilized for active cost management. Another 57% stated that they were aware of the matter but did not actively use it for cost management. Only 19% of respondents were totally unaware of this issue. This finding is one the authors feel very positive about. Further analysis reveals that greater awareness can be found in medium-sized or large companies, a fact also confirmed statistically (p -value < 0.001), as illustrated in Figure 1.

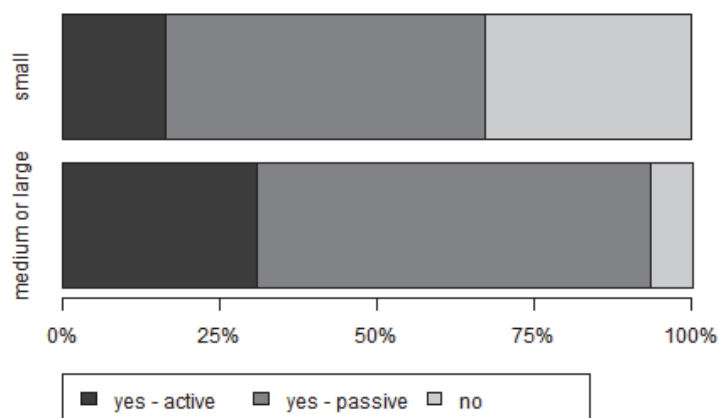


Figure 1. Utilization of knowledge on different assessment of cost variability in small, medium-sized and large enterprises

As is evident, active use of this knowledge was stated by 30.7% of large and medium-sized enterprises but only 16.4% of small companies (answer “yes – active”). In contrast, a negative answer (“no”) was only given by 6.7% of representatives at large and medium-sized businesses in comparison with nearly a third (32.8%) of those at small companies. Hence, it may be concluded from detailed analyses of dependencies that there is a parallel increase in both the size of a enterprise and its awareness (and actual use) of costs dependent on factors outside of production volume. Thus, a statistically significant dependence was confirmed between the size of an enterprise and the act of assessing cost variability as conducted by cost drivers extending beyond mere production volume.

Following on from this, there is the matter of the depth of monitoring and analyzing the structure and development of costs - especially overheads, to wit 77.5% of respondents replied positively. Upon closer analysis, it may be observed that small companies (67.5% positive responses) experience overheads that receive limited monitoring; more so than larger businesses (88%). Again, the significance of this was verified through the p-value ($p=0.002$). Given that the above may be assumed by theory and practice, it is necessary to conduct further analysis in relation to another factor - the form of ownership. Again, it is possible to see a difference, one with borderline significance ($p\text{-value} = 0.056$). Under circumstances of foreign ownership, overheads were closely monitored and analyzed in 90.3% of cases, although the rate for domestic ownership was only 73.9%. However, for the sake of objective assessment, it is necessary to note that foreign ownership was more prevalent in medium-sized and large-scale enterprises (See Table 6).

Table 6. Monitoring and analyzing of overheads according to size and ownership of enterprise

	<i>Small enterp.</i>		<i>Medium and large enterp.</i>	
	<i>Domestic</i>	<i>Foreign</i>	<i>Domestic</i>	<i>Foreign</i>
YES	39 (62.9%)	5 (100%)	44 (87.8%)	23 (88.5%)
NO	23 (37.1%)	0 (0%)	6 (12.2%)	3 (11.5%)

Note: relative frequency in brackets

Another comparison is possible with respect to the industrial sector. The greatest number of positive responses were recorded for the manufacture of machinery and equipment (CZ-NACE = 28) at 93.8%. In this case, however, the difference is not significant compared to other sectors: $p\text{-value} = 0.121$.

8. COST BEHAVIOR – SEMI-FIXED OR SEMI-VARIABLE COST

The context of monitoring variable and overhead costs involved further investigation, this being carried out on perceptions of cost behavior dependent on various factors. Nevertheless, the replies given by respondents failed to demonstrate any dependence according to any of the monitored characteristics. Despite this, significant differences can be found by distinguishing between and monitoring semi-fixed and semi-variable costs. Firstly, it is appropriate to mention that only 24.6% of respondents observed such cost differentiation. Moreover, another 25% of respondents also stated that these concepts had never been encountered. Indeed, about half of the participants noted that they did not distinguish between semi-fixed or semi-variable costs. These results reveal that such costs are monitored more frequently by large firms ($p\text{-value} < 0.001$). In fact, the figure for large companies that responded positively equaled 50%; whereas those for medium-sized and small businesses were 25.6% and 10.4%, respectively. This data is detailed in Table 7.

Unequivocal significance was seen when comparing ownership, as utilization of such cost classification occurs far more frequently in foreign companies ($p\text{-value} = 0.018$), specifically in 42% of cases compared with 19.8% domestically. However, the size of the enterprise plays a role in this; foreign firms are usually larger.

Table 7. Differentiation of the semi-variable and semi-fixed cost according the enterprise size

	Small enterp.		Medium enterp.		Large enterp.	
	Abs. freq.	Rel.freq	Abs. freq.	Rel.freq	Abs. freq.	Rel.freq
YES	7	10.4%	10	25.6%	18	50%
NO	38	56.7%	20	51.3%	14	38.9%
NEVER ENCOUNTERED	22	32.8%	9	23.1%	4	11.1%

From a different aspect, it transpired that businesses primarily concerned with piece production *monitored these costs less often* than other firms ($p = 0.023$), which only pertained to 8% of cases compared to 30.1% for the latter. This dependence was observed for small, medium-sized and large firms, although the difference was not significant in each group due the limited sample. This data is given in Table 8.

Table 8 Utilization of semi-variable and semi-fixed cost classification according to enterprise size and type of production

	Small enterp.		Medium enterp.		Large enterp.	
	1-piece prod.	Other prod.	1-piece prod.	Other prod.	1-piece prod.	Other prod.
YES	6.2%	12.5%	0%	31.2%	25%	51.6%
NO/NEVER	93.8%	87.5%	100%	68.8%	75%	48.4%

9. COST BEHAVIOR – STICKY COSTS

This final section describes data on asymmetric cost behavior. Examination was made of perceptions of cost behavior regarding development and delays, in adherence with changes in production volume (in the short- or medium-term).

Such costs can be designated *sticky costs*. In relation to these, 36% of respondents said they were aware of the existence of sticky costs, a statement which is often made by representatives of large enterprises. A high level of importance was also confirmed statistically in large companies, as given by the p-value of the corresponding test <0.001 (61.1% for large firms in contrast with 27.4% for medium-sized and small enterprises).

10. DISCUSSION AND CONCLUSION

This survey together with the previous ones (researches that were executed by the research team of Novák and Popesko in the years 2004 – 2009) carried out confirm that the share of *overhead (fixed) costs* is still relatively high for manufacturing companies, although it has decreased to 33% in the year 2015 in comparison with figures from previous surveys (38% in 2014 and 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.

Globally, as a positive aspect of the one of the findings can be seen that companies are aware of the *importance and significance of cost management*, as well as detailed monitoring of overheads and overhead cost management. This was stated by almost 80% of the respond-

ents studied (85% in pre-test research in 2014). Still, it is not possible to declare that enterprises 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.

In light of the information given above, 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 managing overhead costs and company size. Research confirmed the importance of the association between company size and attention paid to managing particular cost groups. It was noted that, for most issues, there was proof of detailed monitoring and analysis of cost behavior at large and medium-sized enterprises, more so than for small businesses. 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. This dependence was not only confirmed by querying recognition of cost behavior dependencies due to factors other than production volume. This means that firms of all sizes are aware of the different forms of cost behavior and their dependence on factors besides production volume. An interesting finding is that medium-sized enterprises more closely resemble small businesses in certain respects, e.g. in perceiving the existence of asymmetric cost behavior or so-called sticky costs. Otherwise there is no real difference from larger companies; for example, awareness that cost variability may be assessed by factors other than mere production volume, or regarding detailed monitoring of the structure of overheads and their development.

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.

Conclusions can be drawn with respect to the predominant type of production. Activity-Based Costing was applied more frequently to manage costs by enterprises that tended towards mass production. Furthermore, it was found that companies primarily involved in one-piece production were more likely to overlook semi-fixed and semi-variable costs. In both cases, it was noticeable that such observations were also true when comparing enterprises of equal size.

Just like consideration of these perceptions by corporations, the act of assessing and analyzing cost behavior (especially overheads) in the manufacturing sector is also significantly influenced by the given type of industry. The results obtained did not show any significant difference between the three largest sectors and the remaining ones that were monitored, whatever the aspect (size, ownership, prevailing type of production, or type of industry).

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 offered at this time. The findings provided herein prove that minimal awareness existed of asymmetric cost behavior in the enterprises surveyed. Almost 65% of respondents (senior executives at the companies were addressed) had no knowledge of asymmetric cost behavior or of the influence of other factors than production capacity only.

In summary, 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 of cost behavior is improving, and many firms perceive and distinguish dependence of cost behavior on other factors than just the volume of production, conservative approaches still exist to cost management, and the majority of firms maintain adherence to historically rooted models of cost management.

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. The tendency is for companies to seek out more accurate prediction cost models than previously, which may actually be based on very different forms of cost behavior.

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