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Analysis of Deviations – the Role of Controlling in Small and Medium Sized Agricultural Enterprises

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Abstract

One of the main tasks of controlling is to identify the deviations of actually achieved results compared to the planned and to find out reasons for their occurrence. Lack of attention to this activity can have negative impact on the company's performance. The paper focuses on identification of selected research results that was conducted in Slovak agricultural enterprises. The main goal of the paper is to evaluate and analyse the approach of agricultural enterprises in Slovakia to the implementation of deviations analysis. The basic technique applied for data collection was a questionnaire survey, which was supplemented by a direct interview with managers of selected agricultural entities. The implementation of the questionnaire survey was preceded by a pre-research (pilot study) carried out in the Czech Republic. Obtained data were statistically examined applying the XLStat statistical program. Based on achieved research results we confirmed presumptions from the theoretical background elaborated in the paper, stating that the analysis of deviations is an integral part of controlling. Furthermore, we identify problematic areas for deviations analysis and also controlling implementation in agricultural enterprises in Slovakia.

Keywords

Agriculture, agricultural enterprises, analysis of deviations, controlling.

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Introduction

The aim of business entities is to increase the efficiency of business activities (Váryová et al., 2012). The tool for treating the economic systems is controlling, which allows not only detecting the action of economic and non-economic factors, but also their future development, analysis of deviations from the desired state and prepare corrective actions (Sedliačiková et al., 2015). In addition to financial management and cost accounting, control and analysis of deviations also have a dominant position within controlling tasks (Rautenstrauch and Müller, 2005). The ability to recognize impending current deviations from the plan and their successful removal by the management is the benefit of controlling (Chrenková, 2011). Controlling collects data, reconciles information, checks compliance with plans, identifies deviations and proposes measures (Sósová, 2013). Controlling is a suitable tool for recognizing the impending crisis. It should point out in advance any deviations from the healthy development of the company, reveal the causes, diagnose and promptly determine how remediation can be achieved (Smejkal and Rais, 2013). Controlling ensures information coordination between managers at all ornanizational and managerial levels. It builds an information systém that integrates useful information for its needs and in accordance with the request (Simić and Mašić, 2013). If controlling wants to maintain an influential function in the company it needs to adapt to changed expectations from management (Laval, 2015).

In this sense, controlling differs from control, because it not only records the detected changes but also evaluates them, proposing changes to improve the company's activities (Serina, 2012). Deviation analysis is a method through causes of deviations and deviation influencing factors can be identified - controllable and uncontrollable (Ganeva, 2020). Operational deviation analysis is centred on monitoring and evaluation real value vs. planned (comparison plan vs. reality) (Dolinayová and Ľoch, 2015). Access to the right information in the right time is crucial for every subject (Látečková et al., 2018). The analysis of deviations provides information with which the company's

management can then implement qualified decisions (Máče, 2013).

Between the preliminary and final information, we almost always encounter certain deviations, which provide very valuable material for managers. They indicate which areas of the controlled process need to be given increased interest (Hradecký et al., 2008). Deviations assure the necessary flexibility within a company, but also increase possible internal control weaknesses (Swinnen et al., 2012). Either follow-up or continuous detection is used to detect deviations. Subsequent investigation is based on the assessment of compliance with the developed standards comprehensively. It can be only made after exceeding a given point in time. On the other hand, the essence of the continuous detection of deviations, in which the so-called difference methods are used, is their detection directly during the performance of the task (Fibírová and Šoljaková, 2012).

Deviations must be caught in time. As the analysis of deviations is a particularly costly process, it is necessary to address only those deviations that are essential for management. A tolerance limit or significance limit must be predetermined for each monitored quantity (Popesko and Papadaki, 2016). The manager pays more attention to the emergence of a negative deviation from a predetermined plan, although he should focus his attention primarily on the positive deviations that can lead the company towards lasting success. Finding the reasons for positive deviations should be one of the primary tasks of the manager (Lojda, 2011).

Even the most precisely defined and quantified deviation must always be supplemented by the cause of its occurrence, or by determining the responsibility for the occurrence of the deviation and then taking appropriate measures so that its probability is minimized in the future (Scholleová, 2009). A significant benefit is that the emergence of a certain deviation can be directly related to the responsibility and personal goals of the employee or manager. At the same time, however, it is not always possible to objectively assign individual employees responsible for the occurrence of deviations (Petřík, 2005).

Materials and methods

The paper aims to present the results of a research study aimed at mapping the situation in the field of deviations analysis, as one of the main tasks of controlling, within business entities operating in the field of agriculture in Slovakia. The research study was carried out in 2018 based on qualitative and quantitative research. The object of the research was agricultural enterprises operating in Slovakia, while in the centre of our attention were small and medium-sized enterprises, which occupy a significant share in the agrarian structure of Slovakia. As studies show (Pletnev and Barkhatov, 2016; Yoshino and Taghizadech-Hesary, 2019; Stanciu, 2014; Mura and Buleca, 2014; Dobrovič, 2015), small and medium-sized enterprises play an important role in the market economy and are an integral part of it. Lesáková (2007) notes that the condition for the survival of SMEs is their ability to react and adapt to change. Many studies (Sedliačiková et al., 2012; Bednárová, 2008) confirm that the biggest barrier that prevents SMEs from applying new approaches is their fear of innovative methods and modernization.

In order to obtain relevant results from the practice of agricultural enterprises, we conducted research using a questionnaire and direct interviews with representatives of selected enterprises. We followed up on the research we carried out in the Czech Republic. We interviewed 20 agricultural entities that participated in the questionnaire survey In this brief questionnaire survey, we found that:

- agricultural entities in the Czech Republic monitor deviations that arise for them within the scope of their business activities,
- when monitoring deviations, enterprises compare the analysed indicators with indicators from previous periods,
- 80% of surveyed enterprises also deal with the analysis of the causes of deviations,
- the most common cause of deviations is poor planning and incorrect organization.

When creating the target sample of agricultural holdings, we worked with a database provided by the Agricultural Paying Agency. From this database, we created a sample of enterprises by the controlled selection, so that it corresponds to the structure of agricultural enterprises in Slovakia in terms of the legal form of business and size (number of employees). We excluded micro-enterprises from the survey. The companies that formed the sample were represented throughout the territory of the Slovak Republic, so the criterion of location was also met. In order to achieve a higher return on the questionnaires, all agricultural subjects in the sample were contacted by telephone. We contacted a total of 582 agricultural entities with a request to complete the questionnaire in electronic form. After the return of questionnaires and excluding questionnaires that were incorrectly

filled or were filled in by micro-enterprises, we reached the level of 150 correctly completed questionnaire forms from small and medium-sized agricultural entities. Our main goal was to find out whether farms monitor deviations, how they monitor them or look for the causes of their occurrence. That is the most common reason why the results achieved differ from the predetermined plan.

The research study focused on finding answers to the following questions:

- Do you observe deviations when fulfilling the set goals?
- What importance has activity in the company?
- How are deviations monitored in your company?
- Are you researching and looking for the causes of deviations?
- What are the most common causes of deviations in your business?
- In which periods (specifically in which activities) do you evaluate deviations?

The respondents who answered the questions in the questionnaire were company managers (controllers, heads of economic departments, directors). The classification criteria of companies were the size of the farm, the legal form of business, the length of operation of the company on the market and the existence of controlling in the company.

The data obtained from the questionnaire forms were processed in the statistical program Xstat.

In order to further analyse the obtained answers, the Chi-square test was used, which serves to determine the dependence between the studied phenomena. Hypothesis H_0 states that there is no statistically significant dependence between the variables and hypothesis H_1 confirms a significant dependence.

$$\chi^2 = \sum_{j=1}^{k} \frac{(f_{ej} - f_{o,j})^2}{f_{o,j}} \quad (1)$$

where: $f_{e,j}$ – empirical number of statistical units*

$f_{o,j}$ – theoretical number of statistical units

k – number of classes

This test can only be used if the condition is met: $f_{o,j} \geq 5$ for $j = 1,2, \ldots k$.

In addition to the Chi-square test, there is a correspondence map, which is the output of a multidimensional correspondence analysis and which allows assessing categories of a given variable, their interaction and differences between them, or associations with categories of other variables. In order to determine whether the differences found in the sample are statistically significant or may only be the result of coincidence, we used the Friedman test. Hypothesis H_0 represents the equality of order and H_1 confirms the presence of at least one distribution different from the others.

$$\sum_{i=1}^{n}\sum_{i=1}^{k} T_{ij} = \frac{nk(k+1)}{2} \quad (2)$$

where: n – number of blocks

k – number of classes

T_{ij} - order

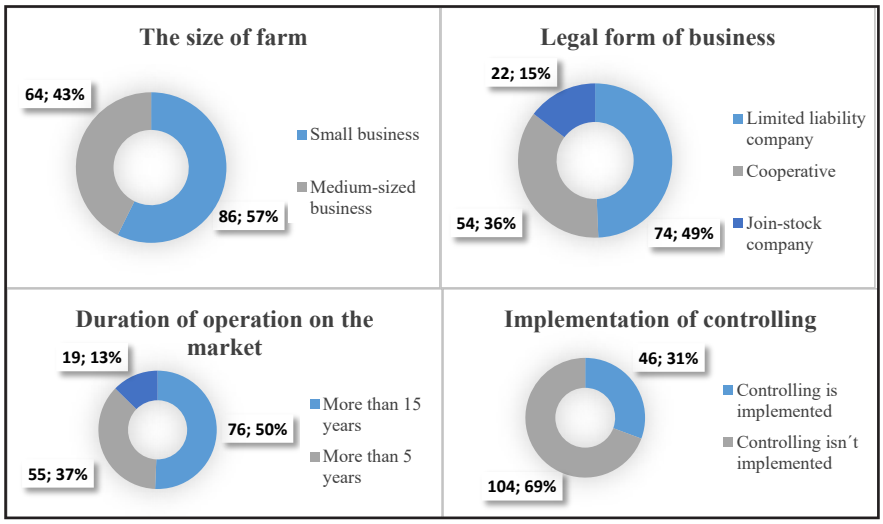

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Figure 1: Structure of the researched enterprises.

If we reject hypothesis H_0 in favour of alternative hypothesis H, which states that treatments do not have the same effect, the unresolved question remains which choices differ statistically significantly from each other. Nemenyi's multiple comparison method is used to compare the differences between the individual files. Asymptotically, the critical values for these multiple comparisons are given by:

$$q_{k,\infty}(\alpha)\sqrt{\frac{1}{12}nk(k+1)} \quad (3)$$

where: $q_{k,\infty}(\alpha)$ - critical range value of the independent random variables with distribution N (0, 1).

Results and discussion

The agricultural sector is an important part of an economy and has its own specifics. Its specificities are primarily of the seasonal nature of production and dependence on natural conditions (Steklá et al., 2015). According to the abovementioned information, agricultural holdings must pay close attention to the analysis of deviations. The analysis of deviations has its irreplaceable place within the controlling tasks. Its aim is not only to detect possible future deviations, but also to find the cause of their potential occurrence, and thus prevent the occurrence of a given deviation in the future. This means finding the cause of a possible deviation before it occurs. As part of a research study, we found out whether agricultural enterprises in Slovakia monitor the deviations that arise within their entrepreneurial activities. The responses of small and medium-sized agricultural entities vary considerably. While most medium-sized enterprises (72%) companies monitor deviations, in the case of small enterprises it is more or less equal, because only 46 (53%) small enterprises pay attention to the occurrence of deviations. Subsequently, we found out how important these subjects consider the implementation of the activity. On a scale of 0 - 5 (0 - no importance, 5 - the greatest importance) questioned managers had to evaluate the importance of division implementation in the company. The modal value of the respondents' answers (mode = 4) confirms the more than average importance of this activity (Table 1).

In order to further investigate the respondents'

Size of the enterprise	
H_0	There is no statistically significant relationship between company size and deviation tracking
H_1	There is a statistically significant relationship between the size of the company and the monitoring of deviation
Significance of the test (p value)	0.0222
Comparison	$p < 0.05$
Result of the test	Acceptance of H_1
Pearson´s correlation coefficient	0.1867
Time on the market	
H_0	There is no statistically significant relationship between the length of a company's presence in the market and the monitoring of deviations
H_1	There is a statistical relationship between the length of a company's presence in the market and the monitoring of deviations
Significance of the test (p value)	0.0005
Comparison	$p < 0.05$
Result of the test	Acceptance of H_1
Pearson´s correlation coefficient	0.3192
Legal form of business	
H_0	There is no statistically significant relationship between the legal form of the business and the monitoring of deviations
H_1	There is a statistically significant relationship between the legal form of the business and the monitoring of deviations
Significance of the test (p value)	0.4575
Comparison	$p > 0.05$
Result of the test	Acceptance of H_0

Source: own processing, XLStat

Table 1: Outcome of Chi-quadrat test a Pearson´s correlation coefficient.

answers, we performed a Chi-square test to determine the dependence and Pearson's correlation coefficient to determine the strength of the dependence.

The result of the Chi-square test shows that the size of the company has an impact on the monitoring of deviations within observed companies. Therefore, we reject the null hypothesis at the level of significance alpha = 0.05 related to the absence of dependence and accept an alternative hypothesis related to the existence of the enterprise and the size of the enterprise. The coefficient expressing the strength of dependence refers only to a weak dependence. When finding the dependence between the monitoring of deviations in the company and the length of operation on the market, the result of the Chi-square test again showed the same result and confirmed the dependence. We again rejected the null hypothesis of the absence of dependence and accept the alternative hypothesis. The strength of the dependence expressed by the coefficient of dependence ranges from weak to medium. The influence of the last analysed factor, the legal form of business, has not been proven. The chi-square test did not confirm dependence, which means that the null hypothesis that there is no dependence cannot be rejected. Furthermore, we aimed to identify whether there is a dependence between the existence of controlling in the company and the monitoring of deviations. We performed the Chi-square test again.

Since the calculated value of p is lower than the level of significance alfa = 0.05, we reject the null hypothesis and accept an alternative hypothesis that refers to dependence between the existence of controlling in the company and the monitoring of deviations. Pearson's correlation coefficient refers to a medium-strong dependence (Table 2).

In the Figure 2 we show a correspondence map on which the relationship between variables is visualized. Almost all companies that have implemented controlling also monitor the deviations. This means that answers of the respondents to the two selected questions correspond and confirm that analysis of deviations is one of the main tasks of controlling, as written by Máče (2013), Synek (2011), Dolinayová and Ľoch (2015) and many others.

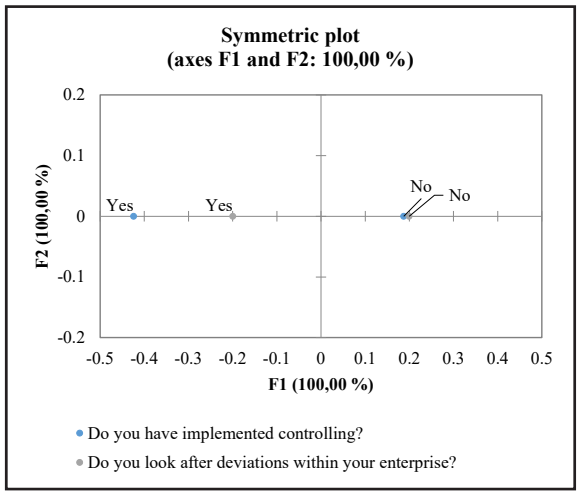

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Figure 2: Correspondence map.

In the next question, we asked respondents who monitor deviations about the system of monitoring. As part of the monitoring of deviations, the actually achieved results are compared with the expected ones. Expected results represent standards that may take the form of planned results or may be in the form of results achieved in previous years. These can be determined in natural or in financial terms.

As shown in Figure 3, investigated the structure of responses when comparing respondents representing small enterprises and respondents representing medium-sized enterprises is very similar. It means that the use of different methods of monitoring deviations in small and medium-sized enterprises is almost identical. Most

H_0	There is no statistically significant relationship between the existence of controlling in the company and the monitoring of deviations
H_1	There is a statistically significant relationship between the existence of controlling in the company and the monitoring of deviations
Significance of the test (p value)	0.0001
Comparison	$p < 0.05$
Result of the test	Acceptance of H_1
Pearson's correlation coefficient	0.4093

Source: own processing, XLStat

Table 2: The result of the Chi-square test and the Pearson correlation coefficient.

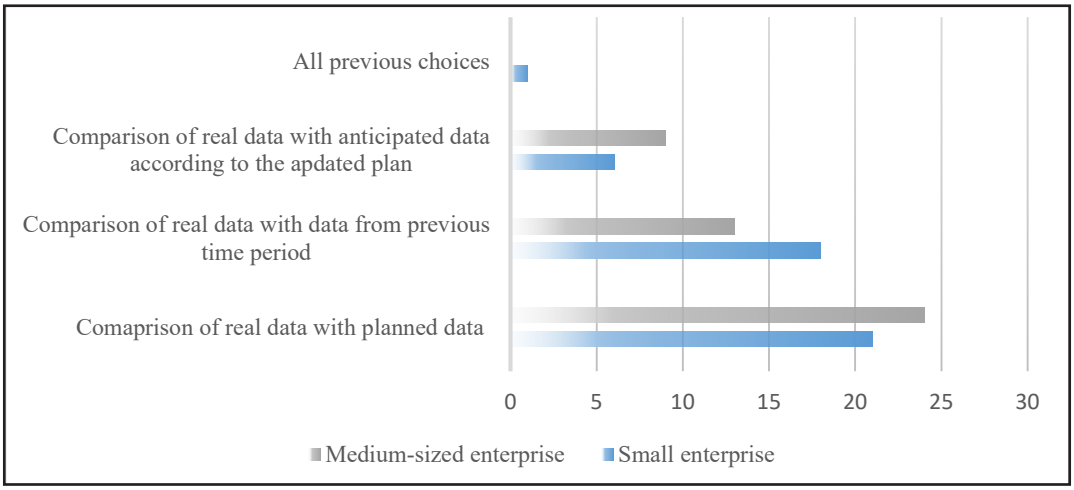

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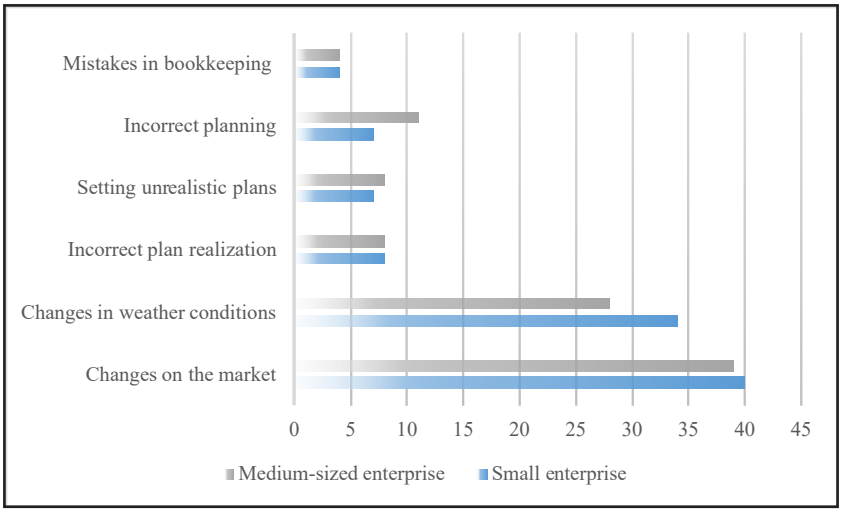
Figure 3: Method of deviations monitoring within agricultural holdings.

of the small enterprises, a total of 21 (46%) and the most medium-sized enterprises, a total of 24 (52%) compare the actual data with the planned data. The comparison of the actual data with the expected data according to the updated plan is performed by 6 (13%) small agricultural entities and 9 (20%) medium-sized ones. Only 1 small enterprise (2%) stated that it implements all previous methods of monitoring deviations.

The fact that farms are not flexible by planning we evaluate as a negative fact. Látečková et al. (2018) also confirms that flexibility and integration are the basic factors of well-functioning economic systems. As explained in the abovementioned text, we must emphasize that only a small number of agricultural holdings incorporate into their original plans the changes that will occur during its implementation. It can be said that these farms approach planning is very flexible, using up-to-date information That is also reflected in their flexible management. Such planning and the resulting monitoring of deviations is desirable from the point of view of controlling. We further asked respondents who monitor the deviations if they are also looking for the cause of occurrence. The only identification of the generated deviations does not bring any useful information for the company. From all 92 agricultural holdings (small and medium-sized) following deviations, 91 (99%) of them looks also for the cause of deviation. Scholleová (2009), Petřík (2005), Fibírová and Šoljaková (2012) argue that even the most precisely defined and quantified deviation must always be supplemented by the cause of its occurrence. As the majority answered positively, we also examined the most common causes of deviations in their business. Respondents could choose more than one option, or they could write their own answer.

From the Figure 4 it is clear at first sight that both small and medium-sized enterprises pay the greatest importance to the emergence of deviations related to changes in market conditions. 40 (87%) medium-sized enterprises and 39 (85%) small enterprises chose this option. The second most frequent response for all three types of companies was the change in weather conditions. This is due to the fact that, compared to other sectors of the economy, agriculture is significantly affected by the weather. This factor is not in the hands of agricultural holdings. Natural disasters, pests, diseases, animal diseases, epidemics are considered to be the most significant risks in agriculture. Changes in weather conditions, as the cause of deviations, concern 28 (61%) medium-sized enterprises and 34 (74%) small enterprises. Jankelová et al. (2017) confirm that the production process in agriculture directly depends on the climatic conditions, which determine the risk level in different ways in the individual areas. Changes in market conditions and changes in weather conditions are factors that are not entirely or at all controllable by agricultural holdings. According to Juríčková et al. (2018) agricultural businessmen, therefore prefer to plan their managerial works in a shorter perspective, as they have to react to the challenges of given concrete and insisting situation.

The interview we conducted with selected agricultural subjects confirmed that the most common causes of deviations are the two factors described above. Farms also added that changes in weather conditions also affect changes



Source: own processing

Figure 4: Most common causes of deviations within agricultural enterprises.

in market conditions (e.g. due to the non-harvest of individual commodities, market prices increase and vice versa). There are also factors that are fully in the hands of the entrepreneurs. Farmers are aware that deviations can also be caused by deviations arising within the holding. These mainly cause such as incorrect planning, incorrect implementation of plans, setting unrealistic goals or errors in accounting.

Another question we asked was intended to find out in which activities and in which periods farms evaluate deviations. We offered respondents a choice of several options, or they could write their own answer. Using the Friedman test, we determined whether there were statistically significant differences in farm responses (Table 3).

H_0	There are no statistically significant differences in the frequency of evaluation of deviations for individual activities
H_1	There are statistically significant differences in the frequency of evaluation of deviations for individual activities
Significance of the test (p value)	0.0001
Comparison	$p < 0.05$
Result of the test	Acceptance of H_1
Pearson's correlation coefficient	0.4093

Source: own processing, XLStat

Table 3: Results of Friedman test.

Using the Friedman test, we concluded that we reject the null hypothesis and accept the alternative hypothesis, which states that there are statistically significant differences in the frequency of evaluation of deviations according to individual activities. A deeper look at the given issue is offered by Neményi's method. Results are given in the Table 4. According to the result of Neményi's method, we state that respondents most often check the price differences of inputs. The second most frequently performed control focused on the detection of deviations is the inspection of numerous states of outputs. On the contrary, the least attention is paid by agricultural holdings to the control of stocks, as well as to the control of product quality, because they do not carry out inspections in these activities as often as in the above-mentioned activities.

Activity	**Groups**	
Inventory check	A	
Quality control of outputs	A	
Checking the numerous states of the outputs	A	B
Control of price differences of inputs		B

Source: own processing, XLStat

Table 4: Results of Neményi´s method.

The Figure 5 offers a more detailed look at how often agricultural entities evaluate deviations in specific activities. Most farms in the research sample inspect all the named activities at monthly intervals. A relatively large percentage of subjects evaluate deviations in the given activities on a weekly and quarterly basis. 20% of respondents stated that they evaluate deviations in the quality of outputs on a daily basis, and 15% of entities perform a daily inventory check. Some

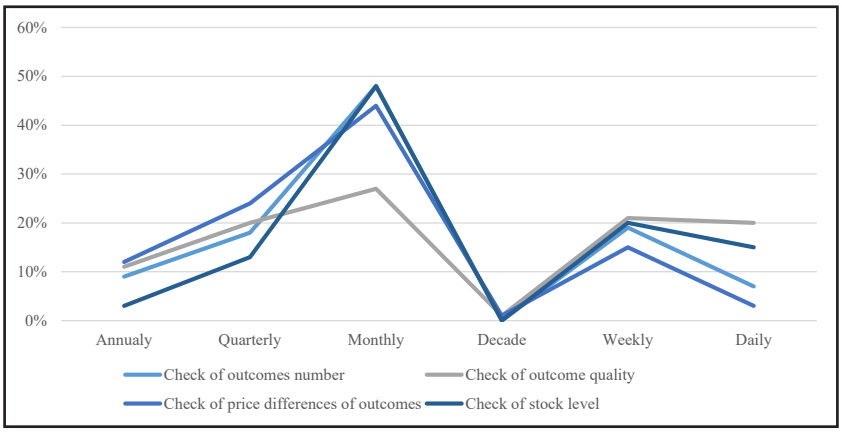


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Figure 5: Intervals for evaluating deviations in specific activities.

entities stated that they carry out inspections of the activities only annually. After an interview with selected agricultural entities, we can say that the daily control of the quality of outputs is carried out only in selected sections of production, especially in animal production. A typical example is a milk, the quality of which is checked every day. Also, the daily stock control is performed only in selected sections, e.g., compound feed for livestock and farm animals is inspected daily.

Conclusion

Companies in the Czech and Slovak Republic have been gradually adopting several concepts and tools for measuring and managing performance and are more familiar with them and the application process. The vast majority of their application is still limited in comparison to the rest of the world (Zámečník and Rajnoha, 2015). The issues of assessing the effectiveness of the company management system as a whole or of its individual sub-systems while making managerial decisions on their implementation are becoming an urgent issue of modern management (Kuzmina-Merlino and Savina, 2015). Monitoring and analysis of actual economic processes is an important tool for operational controlling. The aim of monitoring is to provide the management relevant information about the deviations of the actual revenues, expenses, profit, etc. (Dolinayová and Ľoch, 2015). Our research confirmed that the analysis of deviations is one of the most important controlling activities as there is a demonstrable statistical dependence between them (monitoring of deviations and the existence of controlling in the company). Deviation reflections focus on critically evaluating the success of decisions (Pietsch and Scherm, 2001). The problem of Slovak agricultural enterprises is that they compare the resulting deviations by comparing the actually achieved results with planned and not with expected results according to the updated plan. From the creation of the plan to its comparison with reality, they do not incorporate any changes occurring during its implementation. Such an approach lacks the basic feature of controlling, namely the reaction over time. The most common cause of deviations are changes in market conditions, which often result from changes in weather conditions, on which agriculture is more dependent than other sectors. Analysis of deviations should be a priority for all companies that want to be competitive in the market. However, our research has revealed shortcomings in this area. Not just the analysis of deviations, but also the planning itself represents important controlling activity. These two activities can bring effective results only if they are interconnected. Uur research revealed that shorcomings made by farms are caused by unsufiiccient planning. Respondents' answers pointed to the low flexibility of farms in response to changes in planning. Based on our finding we suggest further research is needed. If company lack a good and precise planning system, it is almost unimaginable to analyse deviations and their causes. If a business entity is interested in completing their business as long as possible, it is necessary to realize innovations that drive business and are regarded as a tool to maintain competitiveness (Rajnoha and Lorincová, 2015).

The future of agricultural enterprises depends on the flexibility of the management concept, which can respond quickly to frequent, dynamically changing market conditions. Deviations analysis as one of the tasks of controlling leads to corporate

flexibility. It reveals differences before the end of the process and allows corrective action to be taken at an early stage to prevent inconsistency between the reality and the plan.

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