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## **Specifics of Forest Enterprises' Performance Measurement**

### **Besonderheiten der Leistungsmessung bei Forstbetrieben**

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**Keywords:** Performance, Non Wood Forest Products, Return on Equity, Profitability

**Schlüsselbegriffe:** Performance, Nichtholzprodukte, Eigenkapitalrentabilität, Profitabilität

### **Summary**

The paper deals with determining forest enterprises' performance in Slovakia. The authors draw attention to the general methods used for performance analysis based on the analysis of the enterprise's profitability. The paper contains goal settings and methods for performance analysis and highlights the specific application of these methods in forest enterprises as well as difficulties in obtaining input data. The results show that the highest performance of forest enterprises was noted in the years of 2011 and 2014. The more detailed analysis of performance – based on the relation between the analytically determined input and the material output of the transformation process (Zalai, 2013) – confirmed that the increased performance was triggered by in-

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tensified timber harvesting. Recommendations and conclusions for the performance analysis of forest enterprises as well as the evaluation of the performance of forestry in Slovakia are presented in the last part.

## **Zusammenfassung**

Der Artikel befasst sich mit der Leistungsmessung slowakischer Forstbetriebe. In diesem Artikel werden allgemeine Methoden zur Leistungsmessung herangezogen welche auf der Analyse der betrieblichen Profitabilität aufbauen. Der Beitrag beschreibt Zielsetzungen und Methoden der Leistungsmessung und geht auf die spezifische Anwendung in Forstbetrieben ein. Auf die Herausforderung bei der Beschaffung von Inputdaten wird separat eingegangen. Die Ergebnisse zeigen, dass die Forstbetriebe die höchste Performanz in den Jahren 2011 und 2014 erreicht haben. Eine detaillierte Analyse der Ergebnisse - aufbauend auf dem Zusammenhang zwischen analytisch definiertem Input und dem materiellen Output des Transformationsprozesses (Zalai, 2013) - hat gezeigt, dass diese Höchstwerte auf eine Intensivierung des Holzeinschlages zurückzuführen sind. Der letzte Teil enthält Empfehlungen und Schlussfolgerungen bezüglich der Leistungsanalyse von Forstbetrieben sowie eine Evaluierung der Leistung slowakischer Forstbetriebe.

## **1. Introduction**

The aim of every business entity, including forest enterprises, is to succeed in the current highly competitive environment and, at the same time, to make a profit. However, in addition to this aim, forest enterprises have to meet economic goals and also other objectives, such as providing ecosystem services that affect the processes and economic results of the businesses of forest enterprises.

Main goal of the paper is to draw attention to the results of evaluation of the forest enterprises success in Slovakia by means of performance analysis. In the paper, the general methodologies are used for the performance analysis and, moreover, authors point out specifics of forest production and management of forestry assets and their impact on the performance of forest enterprises. As reported earlier (Neumaierová & Neumaier, 2002), the value of the company is determined by its performance. So if we want to increase the value of the company, it is necessary to improve its performance. Company performance criteria are the result of:

- time value of money as money that we have today is of different value than money

received in the future, or present revenues have higher value than expected revenues,

- risks of investing as a safe investment is more valuable than the risky one,
- expectations of investors as maximization of the wealth of owners implies maximization of the net present value of the company.

According to the above mentioned, there were several methodological procedures elaborated for evaluating company performance, the theoretical foundations dating back to the 1980-ies and originating in the USA. Their founders were professors of American business schools (Brealey & Myers, 1992; Copeland, Koller & Murrin, 1991).

However, in case of forest enterprises, we are facing problems of performance measurement that arise from the specifics related to the management of forest land. Therefore, in this paper, the indicators that eliminate weaknesses of classical approaches are suggested for general use.

The Slovak Republic (SR) covers a rather small area but the proportion of forest is relatively high compared to that of other European countries. In 2013, the area of forest land was 1,942 thousand hectares, or 41 % of the total land area. Slovak forests are characterised by high levels of diversity, with both coniferous (39.3 %) and broadleaved species (60.7 %) abundant. Forest land on the territory of the SR is owned by the state (app. 40 % of forest area) and non-state entities (app. 60 % of all forests). The categories of non-state forests include those under private, community, church, agricultural cooperative and municipal ownership. An area of 54 % of forest land is managed by the 4 state organizations, the largest one is the state enterprise Forests of the Slovak Republic, Banská Bystrica (Ambrušová et al, 2015). The contribution of forestry to the GDP in SR is below 1 %. The domestic roundwood production was 9.417 mil. m<sup>3</sup> in 2014. This volume represents the actual felling and is relatively stable from a long-term perspective, although the share of accidental felling is quite high (up to 70%) (Parobek et al, 2014).

## 2. Material and Methods

Performance is a rather broad term – in general, it defines the characteristics of how the examined subject provides certain activity, based on the similarities with the reference way of providing such activity. The interpretation of the performance characteristics results from the ability to compare the examined phenomenon with the reference one according to the given criteria scales (Wagner, 2009).

According to the definition of the European Foundation for Quality Management, performance is perceived as the level of results obtained by the individuals, groups, orga-

nizations and their processes (Nenadál, 2001). Using performance, the picture of an enterprise is presented from the financial as well as non-financial point of view and, moreover, performance may serve as a tool for the competitiveness assessment and, in a broader context, for the assessment of its vitality and further development.

A large segment of forestry research literature (Drolet & LeBel, 2010; Posavec, Zelic, Fliszar, Beljan, 2011; Šišák, Riedl, Dudík, 2016) has contributed to the advancement of knowledge from the perspective of effectiveness and efficiency by describing performance in a technical and statistical manner through the development of various analytical models that can be applied to forest harvesting, production-oriented dashboards, productivity surveys or by studying the impact of external economic conditions on operating costs.

The traditional way of performance measuring is based on the evaluation of the selected financial indicators of profitability and productivity, used in particular in following analyses:

- income and revenue analysis,
- profitability analysis,
- profit margin analysis,
- economic value added analysis.

Based on the assumption that turnovers are indicators of financial performance, then these should be analysed from different points of view, especially as follows:

- revenues from main activities, namely revenues from own products, services and goods,
- revenues from the sale of fixed assets and inventory,
- in-house performances,
- financial income
- extraordinary income.

All of these items help to increase total revenues and thus also to increase performance. They need to be assessed separately as the corporate management should be interested primarily to increase revenues from the main activity. If the growth of revenue is triggered by an increased share of revenues from the sale of fixed assets and inventory, such divestments may indicate financial problems. Also growth of in-house

services is undesirable as it depletes and binds financial resources necessary for the development of the company. The growth of financial income, which is not associated with the main activity of the company, points out that the financial resources of the company are used for savings and not used to expand the production. Long-term growth of extraordinary income is another indication of things going off course. Apart from revenues it is necessary to analyse also the costs, because if they grow at a faster rate than revenues, business performance will be declining.

Data for the analysis of sales, costs and profit is provided by the income statement, which is not available for all forest enterprises. Therefore, in order to analyse revenues, focus will be placed on the comparison of the proportion of revenues originating from the sale of timber on the total revenues. The research sample consisted of all forest enterprises and thus, aggregated data of revenues, costs and profit of all forest enterprises in Slovakia as provided by the Green Reports on Forestry from the years of 2011 to 2015 (cf. References).

When analysing the income and revenues, it is also necessary to consider the impact of legislative requirements, which will limit the results of forest production as a result of prescribed forest management plans. According to the SR Forest Act, all forest owners (or users) have to perform forest management by authorized forest managers according to the valid forest management plans that limit e.g. the volume of timber harvesting. Thus, increased revenues, in addition to growth in production, can be brought about mainly by increased prices of outputs. However, here we face trade barriers resulting from the structure of timber demand.

The effect of ecosystem services is significantly present in terms of a reduced possibility to decrease costs of forest management. Forest enterprises have to provide satisfactory levels of such services. At least in certain cases, this leads to increased costs of management, including the costs of communication of these issues (Lichý, 2013). These specific issues are analysed by a number of authors who deal with the evaluation of ecosystem services (Croitoru, 2007; Trenčiansky, 2011, Šišák & Stýblo, 2013), the analysis of profitability and impact of economic cycles to the economic viability and sustainable development of forest management (Krečmer, 1994; Kupčák, 2014; Tutka, 2013).

The analysis of profitability is based on the analysis of profit generation from either own or total assets (Brealey & Myers, 1992; Hajdúchová, 2000). In order to measure performance using the methods of profitability analysis, obtaining input data is rather difficult because a lot of non-state forest enterprises use only a system of single entry bookkeeping. When using such a system, only accounts payable are listed in the financial statements and the amount of equity can be calculated as the difference between total assets and account payable, only. Still, the determination of the assets' value is problematic even in the case of double entry bookkeeping – the reason is the fact that the forest enterprises are not able to effectively use their whole forest property,

e.g. due to the restricted forest management in protective and special-purpose forest stands where timber harvesting is limited in favour of certain ecosystem services. Consequently, decreased timber sales lead to decreased performance of forest enterprises.

Performance assessment based on the determination of enterprise value relies on the assumption that the faster the total value of property grows, the higher the performance of the enterprise is (Brealey & Myers, 1992). There are several methods available to determine the enterprise value – the most important ones are the following:

- property methods – based on the bookkeeping (or substantial) value of the enterprise,
- flow methods – based on the analysis of cash (or revenue) flows,
- combined methods – based on the analysis of profit and economic value added.

The scope of this paper does not allow to deal with these generally known methods comprehensively. Thus, only some specifics related to their application in forest enterprises are mentioned.

The bookkeeping method needs internal analysis in order to evaluate assets according to the so-called fair value. Considering incorporeal property, it is necessary to include also the value of ecosystem services (Šišák, Riedl, Dudík, 2016). Moreover, in order to determine the value of financial property, it is necessary to discount (or compound) it for actual time value. Considering this methodology, other problems are associated with the market evaluation of forest land and forest stands.

The method of net present value is based on the assumption that the enterprise value shall be higher than the value invested to the enterprise establishment. The enterprise value shall be calculated based on the discounted financial flows according to the following formulas (Neumaierová & Neumaier, 2002):

$$NPV = \sum_{t=1}^T \frac{C_t}{(1+r)^t} - C_0$$

where:

$C_t$  = net cash inflow during the period  $t$

$C_0$  = total initial investment costs

$r$  = discount rate, and

$t$  = number of time periods

$$H = \frac{CF}{r_e}$$

where:

H = Enterprise value for the owner

CF = represents financial flows to the owner and

$r_e$  = alternative cost of capital.

The problem is how to determine the alternative cost of capital – for such purposes the following approximation is used:

- the value of forest interest rate in the interval of  $\langle 1,5; 2,5 \rangle$  (Kolenka, 2006)
- the interest rate of state bonds,
- the interest rate of state bonds reduced by the inflation and increased by the risk of losses due to the decreased stand density,
- costs of equity, i.e. return on equity.

The combined method is based on the calculation of the economic value added (EVA) according to the following formula (Brealey & Myers, 1992):

$$EVA = NP - E * r_e$$

where:

NP = net profit after taxation,

E = equity

$r_e$  = the alternative cost of capital.

EVA determines the value of an enterprise from the long-term point of view. Similarly, as in the case of calculation of profitability, there is also the problem of obtaining information on the value of equity here. All before-mentioned methods can be used for performance analysis in the case of enterprises using double-entry bookkeeping (Balážová, Luptáková, 2016). However, it is not possible in the case of performance analysis of forestry in total, due to problems described above.

Disadvantages of these approaches might be partially compensated by the analytical approaches of performance assessment. They are based on the bilateral relations between the analytically defined input and material output of the transformation process. Such indicators are as follows (Zalai, 2013):

- indicators of productivity and efficiency based on the ratio of Output/Input
- indicators of intensity based on the ratio of Input /Output

In the case of the analysis of the group of forest enterprises, the following indicators have been modified:

1. Indicators of productivity and efficiency:

$$\text{Logging efficiency} = \frac{\text{Sales (EUR)}}{\text{Volume of felling (m3)}}$$

$$\text{Assets efficiency} = \frac{\text{Sales (EUR)}}{\text{Forest crop land (ha)}}$$

$$\text{Inventories efficiency} = \frac{\text{Sales (EUR)}}{\text{Growing stocks (m3)}}$$

2. Indicators of intensity:

$$\text{Resource intensity} = \frac{\text{Growing stocks (m3)}}{\text{Sales (EUR)}}$$



$$\text{Logging intensity} = \frac{\text{Volume of felling (m3)}}{\text{Sales (EUR)}}$$

### 3. Results

The performance analysis based on the flow indicators shows that the performance increased until 2011, then it decreased until 2013 and then, in 2014, again increased, however not as much as in 2011. The profit is highest in 2014 (51.62 mil. EUR) – it indicates that, in 2014, the increase of revenues was higher than the increase of costs as is clearly illustrated in the Fig. 1.

*Table 1: Flow indicators of performance of the Slovak forest enterprises (mil. Eur)*

Tabelle 1: Leistungskennzahlen der slowakischen Forstbetriebe (mill. EUR)

<b>Indicator</b>	<b>2014</b>	<b>2013</b>	<b>2012</b>	<b>2011</b>	<b>2010</b>
Sales	532.88	470.91	494.44	544.24	478.82
Timber sales revenue	430.18	384.73	391.84	433.42	376.88
Costs	481.26	439.38	454.28	495.84	460.71
Profit	51.62	31.60	39.60	48.40	18.11

*Source: own calculation according to the Green reports on Forestry 2012 – 2015 data*

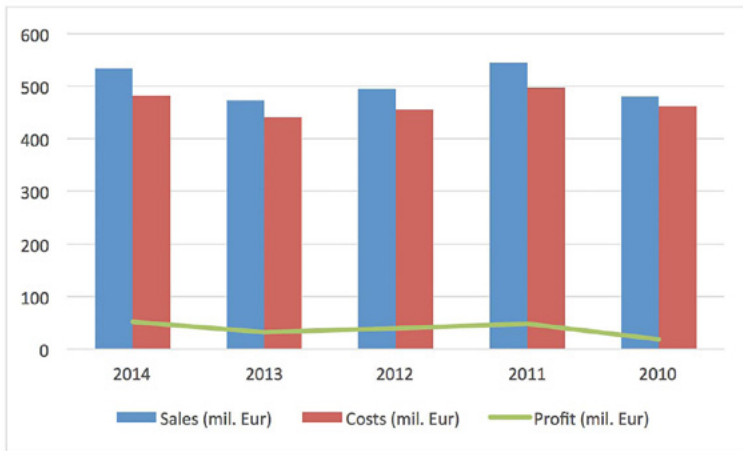


Figure 1: Development of sales, costs and profit

Abbildung 1: Entwicklung von Verkaufserlösen, Kosten und Gewinn

It is positive that the forest enterprises were profitable in all of the analysed years. As stated before, except of the total sales, it is necessary to monitor also the share of timber sales on total sales and thus, the sale of timber assortments as a result of the main activity of forest enterprises (cf. Fig. 2).

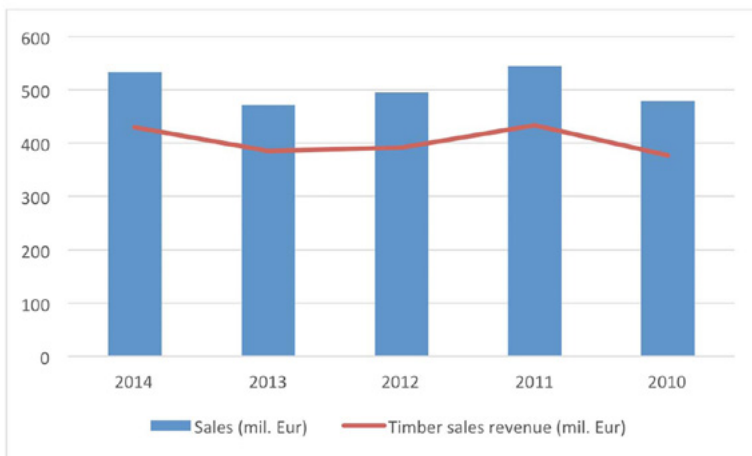


Figure 2: Share of timber sales on total sales

Abbildung 2: Anteil der Holzverkaufserlöse an den gesamten Verkaufserlösen

Based on the Fig. 2, one may state that the development of total sales was rather volatile. Total sales include, except of timber sales, also sales of seedlings, plants, game, etc. Still, the fact that the share of timber sales on total sales is almost constant shall be viewed as the positive fact, with the lowest value of 79 % in 2010 and the highest value of 82 % in 2013. It means that mainly the sales originating from the main activity of forest enterprises determine their performance.

The development of sales and profit was also affected by the fact the levied taxes in forest enterprises, including value added tax, were almost constant – they were lowest in 2010 (49.07 mil. €) and highest in 2011 (56.17 mil. €), even if the profit was highest in 2014. Despite the amount of levied taxes, the support of forest enterprises from public sources is decreasing. Thus, the economic results are negatively affected. Also, the volatility of subsidies is especially high and exceeds the one of other analysed financial indicators. The subsidies provided for forest enterprises were highest in 2011 (109.79 mil. €) and lowest in 2013 (34.775 mil. €). The development of subsidies and taxes is shown in Figure 3.

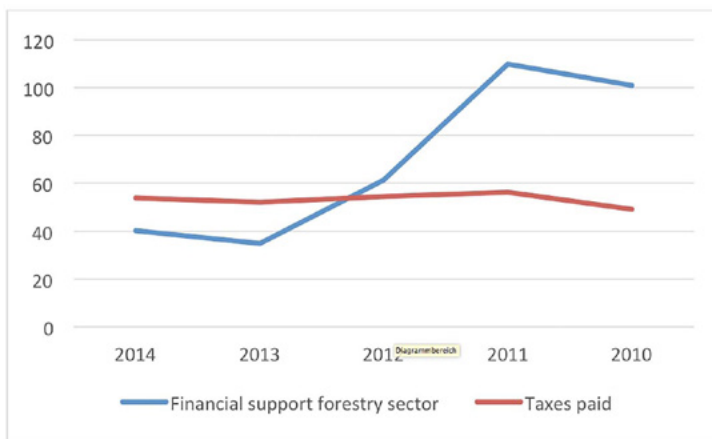


Figure 3: Comparison of levied taxes and obtained subsidies

Abbildung 3: Vergleich der entrichteten Steuern und erhaltenen Förderungen

The impact of external and internal factors on the forest enterprises' performance was analysed by analytical approaches of performance evaluation – the results are shown in Tab. 3 and 4. In order to abstract from the inflation rate, the sales were calculated using real prices according to the discount rates presented in Tab. 2. The impact of

inflation on the sales is presented in Fig. 4. While the sales presented in current prices were higher in 2011, the sales recalculated according to the inflation rate (and thus the enterprise performance) was highest in 2014.

Table 2: Inflation rates and discount rates on the Slovak Republic in the period 2010 to 2014

Tabelle 2: Inflationsrate und Diskontierungsrate der Slowakischen Republik in den Perioden 2010 bis 2014

Indicator	2014	2013	2012	2011	2010
Inflation rate (%)	1	1.4	3.6	3.9	0.7
Discount rate	1	0.9725772	0.8993334	0.8580998	0.965723

Source: Own calculation according to the Statistical Office of the Slovak Republic

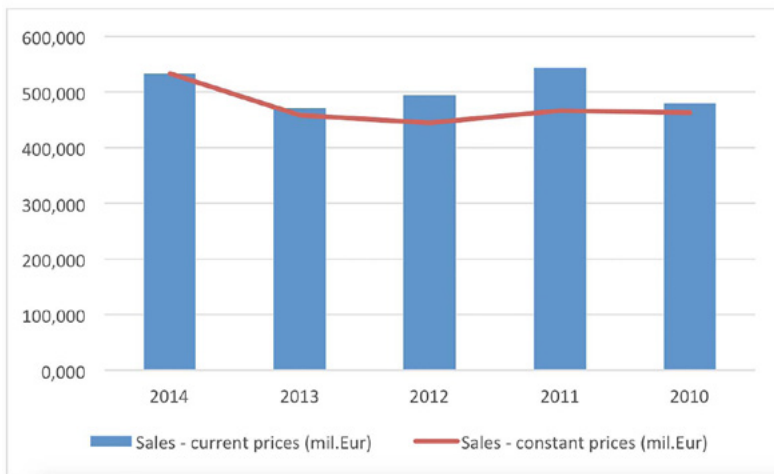


Figure 4: Development of sales in current prices and constant prices

Abbildung 4: Nominale und reale Entwicklung der Verkaufserlöse

Table 3: Final values of indicators of productivity and performance

Tabelle 3: Werte der Indikatoren für Produktivität und Leistung

Indicator	2014	2013	2012	2011	2010
Growing stock (mil. m <sup>3</sup> )	476.6	475.45	472.18	466.07	461.95
Volume of felling (mil. m <sup>3</sup> )	9.42	7.84	8.23	9.46741	9.8597
Forest crop land (ha)	1 941 990	1 941 520	1 940 300	1 940 110	1 938 900
Area of commercial forests (ha)	1 389 500	1 382 800	1 371 290	1 365 890	1 370 200
Sales – current prices (mil. Eur)	532.880	470.910	494.440	544.240	478.820
Sales – constant prices (mil. Eur)	532.880	457.996	444.666	467.012	462.408
Timber sale revenue (mil. Eur)	430.180	384.730	391.840	433.420	376.880
Timber sale revenue – constant prices (mil. Eur)	430.180	374.180	352.395	371.918	363.962
<b>Indicators of productivity and efficiency based on timber sales revenue – real prices</b>					
Logging efficiency (Eur*m <sup>-3</sup> )	56.569	58.418	54.030	49.328	46.899
Assets efficiency (based on forest crop land) (Eur*ha <sup>-1</sup> )	0.00027	0.00024	0.00023	0.00024	0.00024
Inventories efficiency (Eur*m <sup>-3</sup> )	1.118	0.963	0.942	1.002	1.001
<b>Indicators of intensity based on timber sales revenue – current (nominal) prices</b>					
Resource intensity (m <sup>3</sup> *Eur <sup>-1</sup> )	0.894	1.038	1.062	0.998	0.999
Logging intensity (m <sup>3</sup> *Eur <sup>-1</sup> )	0.018	0.017	0.019	0.020	0.021

Source: Own calculation according to the Green Reports on Forestry (2016, 2015, 2014, 2013, 2012)

For assessing the impact of changes in output on selected inputs, the ratios comparing the performance of the two immediately following periods as well as the absolute differences between these variables were used. The resulting values define the input level changes induced by output changes – these changes may be presented in a relative as well as an absolute way. The obtained results have been assigned to one of two groups:

- intensive development – output growth is not caused by any increase in inputs, in some cases inputs decrease,

- extensive development – output growth is caused by increased inputs (the only factor of output growth is the amount of input).

The relation between the increase of performance analysed according to the sales in constant prices and the indicators of efficiency and management intensity is shown in Figure 5.

Figure 5: Comparison of sales indices and indices of efficiency and intensity indicators

Abbildung 5: Vergleich von Erlösindizes sowie Indizes von Effizienz und Intensität

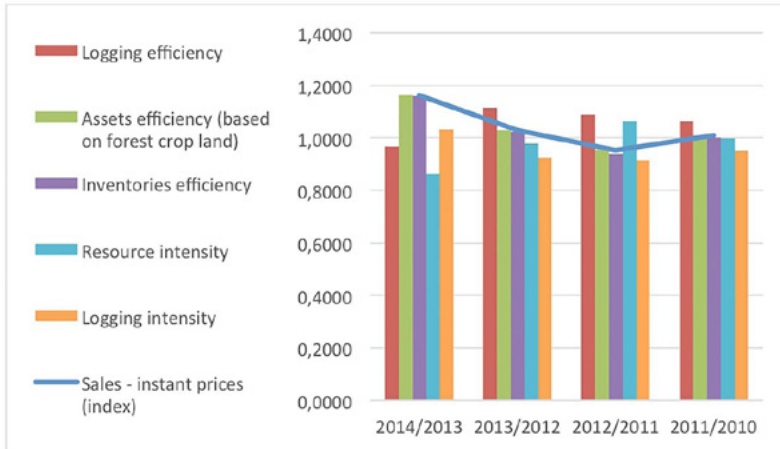


Table 4: Differences of indicators

Tabelle 4: Differenzen zwischen den Indikatorwerten aufeinanderfolgender Perioden

Indicator	2014/2013	2013/2012	2012/2011	2011/2010
Sales – constant prices (index)	1.1635	1.0300	0.9522	1.0100
Sales – constant prices (mil. Eur)	74.8837	13.3299	-22.3458	4.6047
Volume of felling (index)	1.2015	0.9526	0.8693	0.9602
Volume of felling (mil.m3)	1.5800	-0.3900	-1.2374	-0.3923
Logging efficiency	0.9684	1.1146	1.0900	1.0642
Forest crop land (index)	1.0002	1.0006	1.0001	1.0006
Forest crop land (ha)	470.0	1220.0	190.0	1210.0
Assets efficiency (based on forest crop land)	1.1632	1.0293	0.9521	1.0093
Area of commercial forests (index)	1.0048	1.0084	1.0040	0.9969
Area of commercial forests (ha)	6700.0	11510.0	5400.0	-4310.0
Inventories efficiency	1.1607	1.0229	0.9398	1.0010
Growing stock (index)	1.0024	1.0069	1.0131	1.0089
Growing stock (mil.m3)	1.1500	3.2700	6.1100	4.1200
Resource intensity	0.8616	0.9776	1.0640	0.9990
Logging intensity	1.0327	0.9249	0.9130	0.9507

Based on the results of the analyses it is obvious that the forest enterprises' performance was highest in 2011 – it was higher than in 2010 by 1 %. Then, in 2012, the performance decreased by 4.8 % and in 2013 again increased by 3 %. The most intensive increase of performance was observed in 2014 – by 16.35 % in comparison with the previous year. It is positive that the increase of performance in 2011 and 2013 was triggered by the increased efficiency of logging activities and only partially by the increased efficiency of stocks and forestland area. Thus, it is obvious that the performance increase was rather intensive.

On the other hand, the performance increase in 2014 was rather extensive as the increase of sales by 16.35 % was due to the increase of timber felling by 20.15 % - the intensity of logging activities increased by 3.27 % and its efficiency decreased by 5.16 %. There was also an insignificant increase of forest land area by 0.2 % and an increase of commercial forests' area by 4.48 % spotted in 2014. The efficiency of stocks increased by 16.07 % and their intensity decreased by 13.84 %.

#### **4. Discussion**

The performance of forest enterprises is affected by a number of factors as follows:

- enterprises, except of activities generating sales, fulfil also functions that do not generate any sales and, thus, they shall be financed by the state (e.g. production of oxygen),
- enterprises carry costs associated with the fulfilment of ecosystem services that are commercially used by other entities (e.g. water production, soil protection),
- enterprises carry costs that do not generate revenues due to the provision of sustainable forest management (e.g. silvicultural activities in protection forests),
- the enterprises' assets and liabilities include such sources that enterprises use for fulfilment of functions that do not generate any sales (e.g. forest roads),
- the value of the enterprises' assets and liabilities is based on the historical value that is in contradiction with the real actual market value.

The methodological approaches for performance evaluation proposed in this paper are considered suitable for all forest enterprises. However, in order to obtain real results, it is necessary to provide sound accounting data so that it is possible to analyse assets, liabilities and revenues separately for their use in production and non-production forestry activities.

Based on the presented analyses, results show that, despite the recent problems cau-

sed by the risk of climate change and consequent wind throws resulting in increased material intensity and costliness (Brunette et al., 2015), forest enterprises reached intensive increase – this fact shall be perceived as a positive signal for a future where a further increase of the importance of ecosystem services is expected. Long-term profit shall be viewed as an objective criterion of the enterprise market value if the costs associated with the fulfilment of ecosystem services are compensated by appropriate subsidies.

The presented results describe the measurement of business performance adapted to the conditions of forest enterprises. Based on the results, it can be concluded that the growth in performance of forest enterprises was ensured mostly by extensive means, which was reflected in growth of the forest land area and of the growing stocks. In 2011 however, an intensive growth in revenues was recorded as a result of a lower level of harvesting as well as of a decreased area of commercial forests.

Based on the analysis, the following risk factors influencing growth in performance of forest enterprises in Slovakia were identified:

- reduction in volume of the planned harvesting – putting pressure on raw wood price level,
- increased share of random harvesting associated with lower yields per unit of wood and the raised cost of harvesting and silvicultural activities,
- decreasing area of commercial forests,
- reduction of funds from public means.

Performance analysis not only provides insight into the past, it is also a strong management tool supporting the setting of future goals and it also helps to identify the tools to achieve them.

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## References

- Ambrušová, L., Dobšínská, Z., Sarvašová, Z., Hricová, Z., Šálka, J. (2015): Slovakia. In: Forest land ownership change in Europe: COST Action FP1201 FACESMAP country reports. Pp. 531-549. [URL: [http://facesmap.boku.ac.at/index.php/library2/cat\\_view/94-country-reports](http://facesmap.boku.ac.at/index.php/library2/cat_view/94-country-reports)]
- Balážová, M., Luptáková, J. (2016): Application of the Economic Value Added index in the performance evaluation of forest enterprise. *Journal of forest science*, 62 (2016), pp. 191-197
- Brealey, R. A., Myers, S. C. (1992): *Principles of Corporate Finance*. Victoria publishing, McGraw-Hill, Inc., 1992.
- Brunette, M., Holécý, J., Sedliak, M., Tuček, J., Hanewinkel, M. (2015): Actuarial model of forest insurance against multiple natural hazards in fir (*Abies Alba Mill.*) stands in Slovakia. In *Forest policy and economics*. 2015. Vol. 55, pp. 46 - 57.
- Copeland, T., Koller, T., Murrin, J. (1994): *Stanovení hodnoty firm [Measuring and Managing the Value of Companies.]* Victoria publishing, a. s., Praha 1994, ISBN 80-85605-41-4, 359 p.
- Croitoru, L., 2007. Valuing the non-timber forest products in the Mediterranean region. *Ecological Economics* 63, 768-775
- Drolet, S., LeBel, L. (2010): Forest harvesting entrepreneurs, perception of their business status and its influence on performance evaluation. *Forest Policy Econ.*, 12 (2010), pp. 287-298
- Hajdúchová, I. (2000): *Finančná analýza podniku. [Financial analysis of the company].* Scientific Study, TU Zvolen, 2000, 54 p.
- Kolenka, I. (2006): *Teoretické problémy hodnotenia výkonnosti firiem hospodáriacich na lesnom majetku. [Theoretical problems of assessing the performance of companies farming on forest property].* TU Zvolen, Acta Facultatis Forestalis,.
- Krečmer, V. (1994): *Trvale udržiteľný rozvoj a lesní hospodárství v České republice III. [Sustainable development and the Czech Republic Forestry III.].* *Lesnictví - Forestry*, 40(6), pp. 256-264.
- Kupčák, V. (2014): *Přístupy k řešení problematiky ekonomické životaschopnosti trvale udržitelného lesního hospodárství. [Approaches to solving the problems of the economic viability of sustainable forest management].* In: *Proceedings of the seminar with international participation (EK OLH ČAZV)*. Praha: Česká zemědělská univerzita v Praze, pp. 57-72.
- Lichý, J. (2013): *Návrh modelu mediálnej komunikácie lesných podnikov. [Proposal of model of forest enterprise media communication.].* In *Lesnícky časopis = Forestry journal*, 59(4), pp. 276-283
- Neumaier, I., Neumaierova, I. (2002): *Výkonnost a tržní hodnota firmy. [Efficiency and market value of a company.]* Praha: Grada Publishing, a.s.
- Parobek, J., Paluš, H., Kaputa, V., Šupín, M. (2014): Wood flows in Slovakia. *BioResources* 9 (4), pp. 6453 – 6462
- Posavec, S., Zelic, J., Fliszar, I., Beljan, K. (2011): *Implementation of Cost Calculation Model in Forest Evaluation of Fozega Forest Administration.* *Croatian Journal of Forest Engineering*, 32, 2011, pp. 457-467

- Šišák, L., Riedl, M., Dudík, R. (2016): Non-market non-timber forest products in the Czech Republic—Their socio-economic effects and trends in forest land use. *Land Use Policy*, 50, 390-398;
- Šišák, L., up, R. Stýblo, J. (2013): Hodnocení společenské sociálně-ekonomické významnosti funkcí lesa. [Differentiated valuation of socioeconomic importance of forest services by their relationship to the market and its implementation in the Czech Republic.] In: *Forestry Research Reports*, 58, 2013 (1), pp. 50-57
- Tutka, J. (2013): Predpokladané a skutočné dopady krízy v LH SR. [Estimated and actual crisis impacts in the forest sector of SR.] In: *Aktuálne otázky ekonomiky a politiky lesného hospodárstva Slovenskej republiky*. Zvolen: Národné lesnícke centrum – Lesnícky výskumný ústav Zvolen. Pp.43-53
- Trenčiansky, M. (2011): Kvantifikácia vplyvu lesa na kvalitu vody. [Quantification of the impact of forests on water quality.] In *Financovanie lesy - drevo 2011*, Technická univerzita vo Zvolene. pp. 161-165.
- Wagner, J., 2009: *Meření výkonnosti*. [Performance measurement.] Praha: Grada Publishing, a.s.
- Zalai, K., et al. (2013): *Finančno-ekonomická analýza podniku* [Financial and economic analysis of a company]. Bratislava: Vydavateľstvo Sprint dva, s.r.o. 385 p.
- Green Report on Forestry, 2011: Report on forest management in the Slovak Republic in 2010. Bratislava: Ministry of Agriculture and Rural Development. URL <http://mpsr.sk/en/> (accessed 02.02.16).
- Green Report on Forestry, 2012: Report on forest management in the Slovak Republic in 2011. Bratislava: Ministry of Agriculture and Rural Development. URL <http://mpsr.sk/en/> (accessed 02.02.16).
- Green Report on Forestry, 2013: Report on forest management in the Slovak Republic in 2012. Bratislava: Ministry of Agriculture and Rural Development. URL <http://mpsr.sk/en/> (accessed 02.02.16).
- Green Report on Forestry, 2014: Report on forest management in the Slovak Republic in 2013. Bratislava: Ministry of Agriculture and Rural Development. URL <http://mpsr.sk/en/> (accessed 02.02.16).
- Green Report on Forestry, 2015: Report on forest management in the Slovak Republic in 2014. Bratislava: Ministry of Agriculture and Rural Development. URL <http://mpsr.sk/en/> (accessed 02.02.16).
- <https://slovak.statistics.sk/wps/portal/ext/themes/macroeconomic/prices/indicators> (accessed 14.07.16).