Statistical Prognosis of Value Added Level in the Wood and Furniture Industry of the Slovak Republic

INNOVATION AS THE SOURCE OF VALUES IN THE FORESTRY, WOOD PROCESSING AND FURNITURE MANUFACTURING
Hotel Orle – Gdańsk, Poland
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The main goal of this presentation is to present selected statistical tools (correlation and regression analysis, time series theory and extrapolation), whereby it is possible to predict the level of value added in the wood and furniture industry of the Slovak Republic.

The term "**performance**" is used very often, but nowhere in the legislative act is precisely defined. European Foundation for Quality Management defines *"performance"* as *"a rate of achievement by individuals, groups, organizations and processes"*

Performance = Sales, Economic result, **Labor productivity, Value Added (VA)**

VA =   production value - intermediate consumption
- *VA = wages + benefits + social operating surplus*
 (i.e. depreciation +/- profit before paying interest and taxes),
- *production value - for the production of revenues (sales),*
- *intermediate consumption (the cost of raw materials and services).*

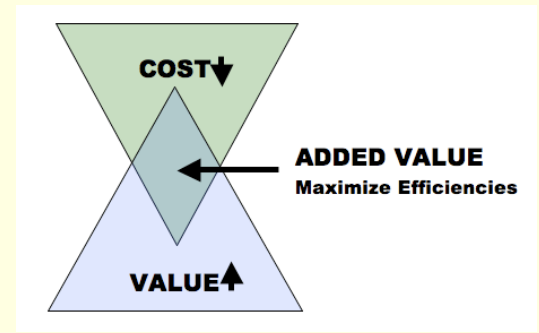# *Marek Potkány, assoc. prof., PhD.*

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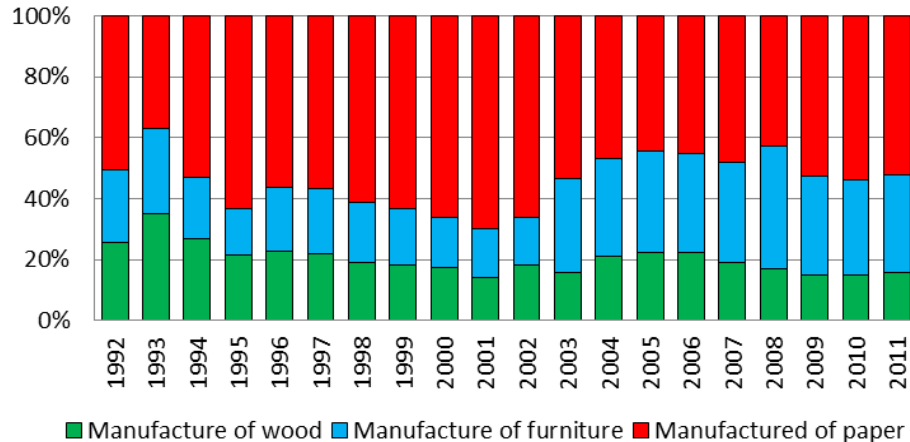
Table 1. Value added (in thousand €) and average monthly wage per employee (in €) in wood processing industry in Slovakia.

Sector of	2006 Value added/ Average wage	2007 Value added/ Average wage	2008 Value added/ Average wage	2009 Value added/ Average wage	2010 Value added/ Average wage	2011 Value added/ Average wage
Manufacture of wood SK NACE 16	136 883,9 /487,42	115 816,7 /543,62	110 402,3 /589,29	75 303,1 /582,74	79 402,1 /635,0	84 377,2 /647,0
Manufacture of furniture SK NACE 31	197 764,7 /573,39	202 159,0 /628,36	265 988,5 /644,89	161 229,5 /635,98	168 859,2 /660,0	169 053,9 /680,0
Manufacture of paper . SK NACE 17	275 022,6 /791,58	295 394,9 /850,99	280 601,4 /899,46	262 339,3 /947,53	290 347,4 /974,00	272 271,9 /965,0

Source: http://portal.statistics.sk/showdoc.do?docid=4

COST ↓

ADDED VALUE
Maximize Efficiencies

VALUE ↑

Value added

Manufacture of wood   Manufacture of furniture   Manufactured of paper

Average monthly wage per employee

Manufacture of Wood   Manufacture of furniture   Manufacture of paper and…

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Simple linear correlation

Figure 1 Correlation between average monthly wage
and value added in wood processing industry in Slovakia

Between the average monthly wage per employee and value added was detected very close direct linear relationship, with r = 0.84. The coefficient of determination $d = r^2$ indicates that the oscillation of the average monthly wage explains 70,6% of value added variability. The remaining 29.4% is attributed to random effects, as well as other factors not included in the regression function. The equation of the regression line has the form y = 272,66 + 0,42385 * x and the value of the mean error of the regression line is $s_{yx} = $ 59,825 mil. €.
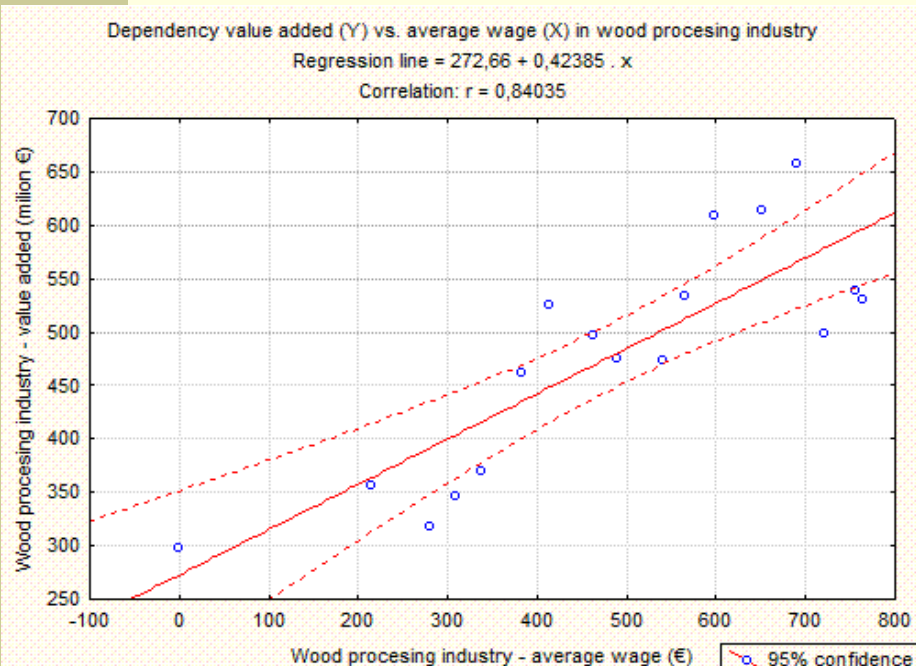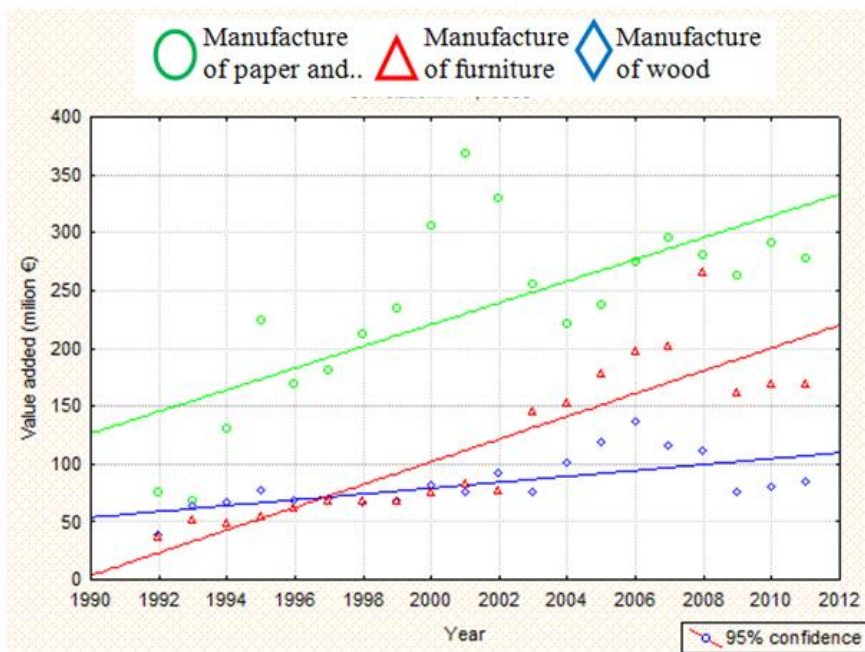
The regression coefficient indicates that an increase in the average monthly wage of a unit (1€) may show an increase in the value added of 0,42385 million € annually. With increase of average wage at 820 €, is possible to predict with the reliability of 68% of the value added at the level of 620,17 mil. € ± 59,825 mil. € (± 1. s_{yx}), or is possible to predict with the reliability 95% of the value added at the level of 620,17 mil. ±119,650 mil. € (± 2.s_{yx}).

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Time series analysis

Figure 2. Development trend of value added in all sectors of wood processing industry in Slovakia (y. 1995 – 2011)

The aim of the statistical analysis of time series is to understand and describe the characteristics of the development and changes in the values of variables at a time and prepare quality mathematical and statistical time series model

Manufacture of wood:
$y = -5004 + 2{,}5415 \cdot x$; $s_{yx} = 18\ 128\ 463$
Manufacture of furniture:
$y = -196E2 + 9{,}8336 \cdot x$; $s_{yx} = 32\ 601\ 287$
Manufacture of paper :
$y = -186E2 + 9{,}3996 \cdot x$; $s_{yx} = 57\ 222\ 169$

The regression coefficient of the linear trend model to interpret that in the years 1992 to 2011 the value added has grown an average annual rate of 2.54 million. € in the manufacture of wood and about 9.83 million. € in the manufacture of furniture.

Standard deviations s_{yx}, measure of quality of the estimated model. Estimated value in the future based on the model trend, we accurately predict the amount of value added in the manufacture of wood as the standard deviation of residues $s_{yx} = 18.1$ mil. € is the smallest.

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Extrapolation

Figure 3 Prediction of the development of value added through the function "Forecast"

The function "forecast" assumes that the level of value added in the Production of wood industry, at the level of the average monthly salary of 820 EUR could be able to achieve the level of 102.5 mil. EUR. The function "forecast" also assumes that the level of value added in the furniture industry, at the level of the average monthly salary of 820 EUR could reach the level of 268.9 mil. EUR.

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Conclusion

Based on the selected performed statistical analyses, it can be stated that:

- *average monthly wage has significantly positive effect on the value added in various sectors of wood processing industry (and revenues),*
- *time series of value added (as well as revenues and average monthly wages) have increasing linear trend in all sectors of wood processing industry in Slovakia,*
- *assuming the increasing of average monthly wage to the level 820 EUR, it would be possible, in sectors of the furniture and manufacture of wood industry, to achieve that level of value added per one employee or the level of sales which has interesting value compared with competitive sectors.*

Cooperation

I would like to request for cooperation in the application of the presented statistical analysis of variables use as are: *value added, number of employees, average monthly wages, profits, sales,* ... in countries... Poland, Slovenia, Croatia, Serbia, Czech Republic....   result = articles, scientific monographs (bi/multi lateral projects).

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Thanks for your attention