Analysis of Investment Effectiveness in the Wood Processing Industry of the Czech Republic

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Abstract

Investment is an important factor affecting the growth performance of the sector. Effective investments can improve the efficiency of production resources using, and make an intensive economic growth of the sector as well as to increase the production capacity of enterprises. The aim of the paper is to present indicators designed to measure the effectiveness of investments at the sectorial level and assess the efficiency of investment in the wood processing industry of the Czech Republic for a period of ten years. Measuring the effectiveness of investment is different at the enterprise level and at the sector level. On the basis of an analysis of available scientific literature, a system of indicators measuring investment effectiveness at the sector level was set up. Input data for the analysis was obtained from database of the Czech Statistics Office with annual data on selected economic indicators in wood processing industry for a period of years 2002 - 2011. Data was used in calculation of individual indicators for evaluating investment effectiveness. Results of analysis showed an insufficient efficiency of investment in the Czech wood processing industry. The effects of the implemented investments don’t occur sufficiently in the most important performance indicators.

1. Introduction

Providing required technical level of tangible fixed assets and its continuous renewal, which is the basis of competitive production, requires a substantial investment. Investment decisions (how much, to what, when, where...
and how to invest) belong among fundamental decisions, which greatly affect the future development of the company and its efficiency. In scientific literature several classifications of investments exist, what results from the view to investments at macro and micro levels. At a macroeconomic level the investments are one component of GDP and also of aggregate demand. Investments are considered as gross private investments in material form. (Sujova, 2005) At a microeconomic level, business investments can be divided into three groups: tangible (substantive, capital, material) investments creating or extending production capacity of the enterprise; intangible (inmaterial) investments as a purchase of know-how, expenditures to research, education, social development and financial investments (Drabek, 2007).

Efficiency of investments at a company level is assessed on the basis of a number of static and dynamic methods evaluating the effectiveness of individual investment projects, where the basic measure is the profitability of investment and return on investment. This issue has long been dealing by the authors of several scientific publications: Drabek, Polach, Merkova, (2011, 2012). Analyses of investments at a sectorial level were performed by authors: Ojurovic et al. (2013), Hlavackova, Safarik (2013, 2014), Sujova et al. (2012), Kupcak (2006).

Wood processing industry (WPI) is a sector based on renewable natural resources of wood raw material. It is therefore able of sustainable growth and be competitive on the international markets. Production of wood-based products in conditions of European countries has a long tradition in regard to sufficient supply of input wood material and as one of the options for obtaining renewable resources it is closely connected with many sectors of the national economy. The interest of the European Union is to build economy based on renewable natural resources, resulting in the need to pay increased attention to the development and support of the WPI. Investments are a prerequisite for the development of enterprises and allow improvement of the economic performance of an industry. That is the reason why the paper is focused on analysis of investment effectiveness in wood-processing industry.

2. Methods

Required material for obtaining relevant outputs was obtained from a secondary research, on the basis of an analysis of available scientific literature dealing with issue of evaluating effectiveness of investments and on the basis of processing statistical data of the wood processing industry. Input data for our analysis we obtained from database of Statistics Office, of Slovakia, the Czech Republic, Austria and Eurostat with annual data on selected economic indicators for a period of years 2002 - 2011. On the basis of an analysis of available scientific literature, a system of indicators measuring investment effectiveness at the sector level was set up.

Intensity of investment activity can be assessed on the base of the investment rate (IR), which shows what proportion of the generated funds is invested. Investment rate can be calculated as a share of investment (I) on revenues (R) and profit (P):

\[
\text{IR}_R = \frac{I}{R} \quad (1)
\]

\[
\text{IR}_P = \frac{I}{P} \quad (2)
\]

\text{IR}_R indicates what part of one monetary unit of sales is invested and \text{IR}_P expresses how much is invested from one monetary unit of generated profit.

Another indicator to assess the rate of investment facilities the capital-labour ratio is, which in the modification reflects how much investment fall on one employee:

\[
\text{IR}_E = \frac{I}{\text{Employees}} \quad (3)
\]

Rate of investment at the sectorial level can be considered also from the view of number of companies operating in the sector. Rate of investment per company expresses how much investments are performed in one company:

\[
\text{IR}_C = \frac{I}{\text{Companies}} \quad (4)
\]

Efficiency of investment at the sector level is a measure of such investment contributes to the economic performance of the sector. Indicators that we proposed to measure the efficiency of investment sectors are as
follows:

- **Return on investment (ROI)** expresses what profit value is created by one invested monetary unit:

\[
\text{ROI} = \frac{\text{Profit}}{\text{I}}
\]

(5)

- **Efficiency of investments** referred to as the productivity of investments is the efficiency of capital using. A background characteristic is the average product of capital, which in microeconomic theory represents the share of production volume fallen on one invested monetary unit. Effectiveness of investments should be monitored in relation to production, sales and value-added:

  - The efficiency of investment in relation to production (EIQ) expresses what production value (Q) is created by one invested monetary unit:

\[
\text{EIQ} = \frac{Q}{I}
\]

(6)

  - The efficiency of investment in relation to sales (EIS) reflects how many revenues (R) fall on one invested monetary unit:

\[
\text{EIR} = \frac{\text{Sales}}{\text{I}}
\]

(7)

  - The efficiency of investment in relation to value added (EIVA) expresses what value the value added (VA) was generated by one monetary unit of investment:

\[
\text{EIVA} = \frac{\text{PH}}{\text{I}}
\]

(8)

- **Marginal efficiency of investments** represents the impact of investment to changes in economic output of the sector. It expresses additional financial output value of the industry (sales, production, value added, profit, equity) generated by additional unit of investment. In other words, marginal efficiency of investments reflects how is increase in values of sales, value-added, profits, capital if there is an increase of investment by one monetary unit (e.g. euro). We have proposed the following indicators for indication of marginal efficiency of investment by modifying the variable: marginal product of capital under the micro-economic theory:

  - MEIR expresses increase of revenues (R) by increase of investment per unit:

\[
\text{MEIR} = \frac{\Delta R}{\Delta I}
\]

(9)

  - MEIQ indicates additional value of production value of the sector (Q) by additional unit of investment:

\[
\text{MEIQ} = \frac{\Delta Q}{\Delta I}
\]

(10)

  - MEIVA shows the increase of value added (VA) by increase of investment per unit:

\[
\text{MEIVA} = \frac{\Delta VA}{\Delta I}
\]

(11)

  - MEIP indicates generated additional profit by one additional unit of investment:

\[
\text{MEIP} = \frac{\Delta P}{\Delta I}
\]

(12)

  - MEIFA expresses the change of fixed assets (FA) by increase of investment per unit:

\[
\text{MEIFA} = \frac{\Delta FA}{\Delta I}
\]

(13)

For the indicator MEI applies:
If MEI > 0 investment growth causes growth in economic indicator of industry.
If $MEI < 0$ increase of investments causes a decrease in economic indicator of sector.
If $|MEI| > 1$ we talk about the multiplier effect of investment, which means that investment growth invokes a multiple change in the economic results of the sector.

Calculation of individual indicators for measuring the effectiveness of investments was applied in the wood processing industry (WPI) and its individual sections in selected, abovementioned countries EU. A characteristic feature of the WPI is processing of raw wood and wood products production at various stage of finalisation. WPI within the classification of business activities of the EU (NACE) consists of three sections:
- NACE 16: primary mechanical wood processing (timber industry),
- NACE 17: primary chemical wood processing (pulp and paper industry),
- NACE 31: secondary wood processing (production of furniture).

For appropriate calculation of indicators values we created application in MS Excel and we analyzed investment effectiveness in WPI and its individual sections from several views:
- analysis of achieved values in indicators measuring effectiveness of investments in the sector;

3. Results and Discussion

The results of indicators measuring the effectiveness of investments in wood processing industry of the Czech Republic for a period of five years are shown in Table 1. Basic input data was the total gross investment of the industry. There is also presented comparison of results in wood processing industry with the results of efficiency of investment in the industry as a whole in the country. The values in the table are in millions euro.

The results of indicators of investment rate in wood processing industry of the Czech republic show that the share of investment per company is only slightly decreasing and it moves at an average of € 10,000 per company, but it is below the industry average. In Czech wood processing industry is an investment rate in regard to revenues at the average of industry CR. Wood processing companies invest at average 6% of generated revenue into capital formation. The amount of investment represents 1.2 times higher than the profit made, what could be considered that by their funding in addition to own also borrowed funds are used. As for capital-labour ratio, at average 10 000 € of investment fall on one employee, which is slightly above the average in Industry.

The results of the investment efficiency show that the wood processing industry is little below the industry average of CR, however, the results positive. On one invested euro fall at average 3.7 euro of value-added and 17 euro of sales. Return on investment is positive, it present an average amount of 87 € in profit per euro invested, which indicates a high efficiency of investments in the Czech wood processing industry.

Looking at the results of the marginal efficiency of investment, it can be seen that investment growth causes a drop in profits, sales, value added and equity, although the situation in the total industry of CR is the opposed. The results also demonstrate that investment growth has a multiplier effect on the decline in sales and equity, which cannot be regarded as a positive phenomenon. As a negative result it can be considered that the increase in investment causes decrease in value added and only a slight increase in production value, that is well under the industry average of CR.

In addition a trend line analysis of investment effectiveness in wood processing industry was performed. Trend line analysis shows the development of efficiency of investment in the wood processing industry of analysed country. The aim of this analysis was to determine the positive and negative effects of investment on economic performance of wood processing industry. For the purposes of carrying out the trend analysis, we selected the most important indicators of investment effectiveness of the sector: efficiency of investments in terms of revenues (IRp), ROI and marginal efficiency of investments in the production (MEIQ) and added value (MEIVA). Results of trend line analysis are shown in Figure 1.
Table 1. Wood Processing Industry (WPI) of the Czech Republic

<table>
<thead>
<tr>
<th>Indicator (mil. €)/year</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Investment rate (IR) in mil. €</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IRC Industry</td>
<td>0.050</td>
<td>0.054</td>
<td>0.036</td>
<td>0.035</td>
<td>0.035</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>0.016</td>
<td>0.018</td>
<td>0.013</td>
<td>0.012</td>
<td>0.010</td>
</tr>
<tr>
<td>IRs Industry</td>
<td>0.06</td>
<td>0.06</td>
<td>0.05</td>
<td>0.04</td>
<td>0.04</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>0.07</td>
<td>0.08</td>
<td>0.07</td>
<td>0.06</td>
<td>0.05</td>
</tr>
<tr>
<td>IRe Industry</td>
<td>0.98</td>
<td>1.81</td>
<td>1.64</td>
<td>0.90</td>
<td>0.98</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>0.96</td>
<td>1.54</td>
<td>1.49</td>
<td>1.21</td>
<td>1.17</td>
</tr>
<tr>
<td>IRi Industry</td>
<td>0.01</td>
<td>0.01</td>
<td>0.00</td>
<td>0.00</td>
<td>0.01</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
<td>0.01</td>
</tr>
<tr>
<td>Efficiency (rentability) of investments in mil. €</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EIVA Industry</td>
<td>4.02</td>
<td>3.38</td>
<td>4.46</td>
<td>5.09</td>
<td>4.77</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>3.88</td>
<td>3.13</td>
<td>3.80</td>
<td>4.21</td>
<td>4.39</td>
</tr>
<tr>
<td>EIR Industry</td>
<td>17.82</td>
<td>15.78</td>
<td>20.29</td>
<td>23.41</td>
<td>22.47</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>15.25</td>
<td>12.49</td>
<td>14.86</td>
<td>16.96</td>
<td>18.74</td>
</tr>
<tr>
<td>ROI Industry</td>
<td>102.4</td>
<td>55.2</td>
<td>61.1</td>
<td>110.7</td>
<td>102.2</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>104.6</td>
<td>64.9</td>
<td>67.1</td>
<td>82.6</td>
<td>85.5</td>
</tr>
<tr>
<td>Marginal efficiency of investments in mil. €</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MEIb Industry</td>
<td>2.05</td>
<td>-3.92</td>
<td>0.43</td>
<td>28.94</td>
<td>0.13</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>0.96</td>
<td>-2.75</td>
<td>0.58</td>
<td>-2.94</td>
<td>0.53</td>
</tr>
<tr>
<td>MEIb Industry</td>
<td>22.45</td>
<td>-3.52</td>
<td>6.75</td>
<td>198.67</td>
<td>12.63</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>7.73</td>
<td>-11.09</td>
<td>5.25</td>
<td>-33.87</td>
<td>-1.18</td>
</tr>
<tr>
<td>MEIb Industry</td>
<td>22.63</td>
<td>-5.51</td>
<td>7.00</td>
<td>205.71</td>
<td>12.53</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>8.16</td>
<td>-4.99</td>
<td>6.08</td>
<td>-27.54</td>
<td>-0.07</td>
</tr>
<tr>
<td>MEIb Industry</td>
<td>6.61</td>
<td>-0.54</td>
<td>-0.05</td>
<td>46.32</td>
<td>-1.05</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>2.21</td>
<td>-0.25</td>
<td>-0.14</td>
<td>-13.35</td>
<td>2.28</td>
</tr>
<tr>
<td>MEIb Industry</td>
<td>4.60</td>
<td>-2.67</td>
<td>1.21</td>
<td>40.31</td>
<td>1.46</td>
</tr>
<tr>
<td>WPI Industry</td>
<td>1.78</td>
<td>-3.23</td>
<td>1.09</td>
<td>-5.75</td>
<td>2.44</td>
</tr>
</tbody>
</table>

Source: own calculations
Looking at the development of indicators in the Czech wood processing industry the similar fluctuations as in Slovakia can be seen. However, despite the fact that wood processing industry in the Czech Republic achieves higher levels of indicator ROI, the development is negative and the projected trend shows continuing decrease of this indicator. Development of marginal efficiency of investment in the production (MEIQ) indicates its gradual decline, and its prognosis is also negative, which means that investments are losing influence on output growth and the growth of value added is affected by investment growth also only in a minor rate. The positive trend can be observed only in the efficiency of investment to revenues, where is a slight increase. The overall development of effectiveness of investments during the decade is in the Czech wood processing industry negative and further decline is expected in next years.

4. Conclusions

Measuring the effectiveness of investment is different at the enterprise level and at the sector level. Enterprises obviously evaluate the effectiveness of individual investment projects based on their profitability. At the sector level we proposed indicators to measure the effectiveness of investments, which are divided into three groups: the investment rate, which reflects the intensity of investment activity in the sector; the efficiency of investment, which indicates the efficiency of investments use and marginal efficiency of investments reflecting the impact of the investment growth on growth of sectorial economic results.

On the basis of presented results we can conclude that the wood processing industry achieves a high return on investment, to which contributes the use of foreign funds to finance investments. Investment growth primarily affects the sales growth and it has a low influence on output growth. Investments in wood processing industry are not able to generate profits and increase value added in the same period. It can be assumed that investments affect their growth in subsequent periods. Performance increase in wood processing industry is conditional to the implementation of effective, development investments that enable to achieve higher added value and to generate higher profits in enterprises. In the Czech wood processing industry the efficiency of investment is not at a sufficient level, the effects of the implemented investments don’t occur sufficiently in the most important performance indicators, such value added, profit and equity of the enterprise are. Effective investments can improve the efficiency of production resources using, and make an intensive economic growth of the sector as well as to increase the production capacity of enterprises in wood processing industry. It is therefore important to monitor the effectiveness of the investments and their effects on the economic results of the sector.

References