Original scientific paper - Izvorni znanstveni rad UDK: 65.011.4

Does productivity affect profitability in dairy processing industry? Evidence from Slovenia, Croatia and Serbia

doi: 10.15567/mljekarstvo.2015.0407

Saša Muminović[1]*, *Željana Aljinović Barać*[2]

[1]Julon d.o.o., Ljubljana, Slovenia, Member of the Aquafil Group,
Letališka cesta 15, 1000 Ljubljana, Slovenia
[2]University of Split, Faculty of Economics, Cvite Fiskovića 5, 21000 Split, Croatia

Received - Prispjelo: 13.04.2015.
Accepted - Prihvaćeno: 23.10.2015.

Abstract

This paper provides insights into productivity in dairy processing companies in Slovenia, Croatia and Serbia. The aim is to find out whether EBITDA per employee, as a measure of overall productivity as well as labour and capital productivity and their management positively affect company's profitability. Literature review shows that this issue was relatively neglected, although increase in productivity is regarded as the most important factor in maintaining a competitive advantage in most developed countries. Results obtained show that comprehensive measure of productivity EBITDA per employee has statistically significant positive impact on company's profitability, the same as productivity management components labour cost competitiveness and capital productivity.

Key words: dairy processing industry, profitability, productivity, cost efficiency, cost competitiveness

Introduction

The dairy processing industry together with dairy farming, dairy traders, retail and customers creates dairy supply chains. Subbaiah et al. (2009) see them as four *echelons*: raw milk suppliers, plant, warehouse and customers. During the transition process, the dairy chains have been restructured in Eastern Europe, caused by combination of transition and globalization (Swinnen et al., 2006). However, a specific pattern of changes in dairy processing industry in Slovenia, Croatia and Serbia was identified. The chain started by foreign investments and acquisition on the local markets. In the already relatively concentrated market, concentration further increased as a result of the acquisitions. Concentration was followed by consolidation. It finished with investments to meet competition challenges (Aljinović Barać and Muminović, 2013).

Today, according to Gardebroek et al. (2010), Muminović and Pavlović (2012) and Aljinović Barać and Muminović (2013) the dairy processing industry in many European countries, including Slovenia, Croatia and Serbia, is characterized by a few large companies with a big market share accompanied by many small processors that often produce for niche markets. The exceptions of such trends are France and Germany where a small number of large companies and quite a large number of medium and small companies exist (Tacken et al., 2009).

The dairy processing industry is among the most profitable industries in Serbia (Muminović et al., 2012). This profitability of the dairy processing industry is a consequence of natural monopoly arising from the fact that the most dairy products are consumed in the region where they are produced. The other dairies in Serbia are even more profitable than the market leader, due to the high prices

*Corresponding author/Dopisni autor: Phone/Tel.: + 386 31 306 258; E-mail: sasa.muminovic@aquafil.com
JEL classification: Q14, G31, G32

of dairy products (in some cases very close to the EU level), lower production costs and lack of EU legislation regulating competition and free market (Muminović and Pavlović, 2012). The statistical data indicates that productivity in the dairy industry in Serbia increased faster than productivity in other sectors of the food industry. In Slovenian dairy industry, productivity increased as employment reduced, yet from an EU perspective, the labour productivity is still low, while for Croatia, there is no data (Van Berkun, 2009). Another previous research, Aljinović Barać and Muminović (2013), has shown that capital investments per employee significantly increase productivity measured by EBITDA and personnel costs in all three countries.

Taking into consideration all above mentioned facts regarding the role of productivity in EU dairy industry, the aim of this paper is to analyse the impact of different productivity measures on profitability of dairy processing industry in Slovenia, Croatia and Serbia. Thus, this research can bring a contribution to the existing literature by providing insights into productivity of Slovenian, Serbian and Croatian dairy processing companies by itself, and especially with regard to their profitability, which is, to our best knowledge, still unexplored contemporary topic in agricultural and corporate finance.

The report on Competitiveness of the EU dairy industry (Tacken et al., 2009) shows *that EU dairy industry can be characterised as innovative and a global player, but it is losing market share*. On the other hand the *improvement in labour productivity and the growth in value added compensate for the loss in market share*. Improved productivity at farm or industry level helps to improve the competitive position. Productivity has been identified as the engine of the economic growth, i.e. higher productivity equals higher GDP (Farrel, 2003). The research Philippot et al. (2011) shows that although the Netherlands is one of the most productive countries within the OECD with a labor productivity rate 40 % higher than OECD the increase of productivity is identified as a key competitiveness factor.

Krugman (1992) stated that *productivity isn't everything, but in the long run it is almost everything. A country's ability to improve its standard of living over time depends almost entirely on its ability to raise its output per worker.* The higher productivity, along with abolition of the EU milk quota, full liberalization, product development and innovation, are identified as factors that can influence the competitiveness of the EU dairy sector (European Union Dairy Sector, 2010). Similar we assume that higher productivity will have the same significance on future competitiveness of the dairy sector in observed countries.

According to the OECD Manual (2001), *labour productivity is a partial productivity measure and reflects the joint influence of a host of factors. It is easily misinterpreted as technical change or as the productivity of the individuals in the labour force*. Furthermore, labour productivity growth was also useful barometer of the U.S. economy's performance, but only until the mid-1980s. Recent research proved high productivity and low GDP during the recession (McGrattan and Prescott, 2012).

Previous researches of productivity in dairy processing industry are quite sparse. Meen et al. (2003) investigated productivity of the dairy processing industry in Turkey as part of the wider research of productivity in Turkey done for McKinsey Global Institute. Productivity performance of Finnish dairy chain together with other Baltic countries: Sweden, Denmark, Germany, Poland, and the three Baltic states were analysed by using partial productivity indicators and indices of total factor productivity (TFP) to investigate productivity growth and productivity levels in both dairy farming and dairy manufacturing (Irz and Kuosmanen, 2014).

Some of the researches addressed dairy productivity, but they are focused on productivity in dairy farming i.e. in Australia (Dahl et al., 2013), in New South Wales (McKenzie, 2013), Finland and Baltic countries (Jansik, 2009) or the EU (European Commission, 2013).

Very interesting findings regarding productivity was in research by Philippot et al. (2011), who examined productivity in dairy farming as part of the research of the competitiveness analysis of the Netherlands and the Dutch dairy cluster. They found that *Dutch dairy farming productivity is much higher than the New Zealand's one due to the high level of R&D which make the Dutch farms well equipped in automation, the high level of the farm specialization and the very productive breed of cow*. However, despite this higher productivity, the average production cost of milk in New Zealand is about one fourth of the Dutch cost due to *the higher environmental*,

health, and safety regulation quality standards costs, the higher cost of labor in the Netherlands and there are inefficiencies as a result of subsidies (lower-than-potential productivity as a result of smaller scale production that has been supported by government).

Latruffe (2010) observed that the improvement in productivity in efficiency increase - efficient use of the existing technology, exploiting economies of scale and in technological progress. These should be the most important issues in Slovenia, Croatia and Serbia because in those countries the capacity usage is approximately up to 70 %, taking information with caution as found data are not recent (Gulan, 2014; Urad RS za makroekonomske analize in razvoj, 2008; Lukač et al., 2000).

According to literature, many empirical studies have been conducted on the topic of productivity, but no one has been focused on impact of productivity on profitability in dairy industry. Furthermore, literature survey indicate that both dairy processing industry and dairy farming have rapidly changed in recent decades, but the way and extent of changes differ in Slovenia, Croatia and Serbia as examples of (South) East European transitional countries, from other, developed European countries. Therefore, the aim of our research is to investigate the relations between profitability and different productivity measures of companies in dairy industry, hoping that this paper will play an important part in recognizing the stated problem and providing certain contribution in the aforementioned economic fields.

Materials and methods

The working hypothesis assumes that companies which manage productivity more efficient will obtain better financial performance measured by profitability ratio return on assets (ROA). In order to test the above relation, the following statistical hypotheses have been developed (alternative form):

H_1 ...Labour productivity management has statistically significant impact on company's profitability.

H_2 ...Capital productivity management has statistically significant impact on company's profitability.

H_3 ...Overall productivity management has statistically significant impact on company's profitability.

Materials

This research is conducted on the sample of Croatian, Slovenian and Serbian companies in the dairy processing industry. A relatively homogenous sample of total 68 companies and 408 company-year observations is provided. Their annual financial reports in succession from 2008 to 2013 were reviewed and companies are selected in sample according to the following criteria:

- A company's main activity is designated in division C10.5 - Manufacture of dairy products of National Classification of Economic Activities.
- Companies in the bankruptcy/liquidation process were excluded from the sample.
- The companies with missing or incomplete data were excluded.

The data set necessary for the research has been extracted from the annual financial reports databases of Croatian Financial Agency (FINA), Serbian Business Registers Agency and Agency of the Republic of Slovenia for Public Legal Records and Related Services. For comparison purposes, all data were converted into a common currency - EUR, using the average annual exchange rate provided by national banks. The data were not been deflated, because inflation rates between countries studied were not significantly different. Detail description of average annual inflation rate measured by Harmonised Indices of Consumer Prices - HICPs which was designed for an international comparison and Real GDP growth rate - volume are presented in Table 1.

A detailed sample size and structure is presented in the Table 2. As it can be seen from the table, the most companies (32 per year) are from Serbia and the smallest numbers of companies (11 per year) are from Slovenia. However, despite the difference in absolute number of the companies their relevance to national dairy processing industry is similar. For example, in year 2013 companies selected in the sample cover 98.3 %, 96.7 % and 90.2 % of total assets of companies in division C10.5 - Manufacture of dairy products in Slovenia, Croatia and Serbia, respectively.

Table 1. HICP - inflation rate/Annual average rate of change (%)
Real GDP growth rate - volume/Percentage change on previous year

		2008	2009	2010	2011	2012	2013
Croatia	Inflation	5.8 %	2.2 %	1.1 %	2.2 %	3.4 %	2.3 %
	GDP growth	2.1 %	-6.9 %	-2.3 %	-0.2 %	-2.2 %	-0.9 %
Serbia	Inflation	8.6 %	6.6 %	10.3 %	7.0 %	12.2 %	2.2 %
	GDP growth	3.8 %	-3.5 %	1.0 %	1.6 %	-1.5 %	2.5 %
Slovenia	Inflation	5.5 %	0.9 %	2.1 %	2.1 %	2.8 %	1.9 %
	GDP growth	3.4 %	-7.9 %	1.3 %	0.7 %	-2.5 %	-1.1 %

Source: authors' adaptation from Eurostat and National Bank of Serbia data base (2014)

Table 2. Sample size and structure (number of dairy companies)

Year	Country			
	Slovenia	Croatia	Serbia	Total
2008	11	25	32	68
2009	11	25	32	68
2010	11	25	32	68
2011	11	25	32	68
2012	11	25	32	68
2013	11	25	32	68
Total	66	150	192	408

Source: estimated according to data from authors' data base (2014)

Variables and methodology

Variables return on assets (ROA) ratio, calculated as operating income divided by total assets is proxy variable for company's profitability and it is set as dependent in multivariate analysis, similar to research of Amato and Wildor (1985), Glancey (1998), Fitzsimmons et al. (2005), Asimakopoulous et al. (2009), Vijayakumar and Devi (2011), Kouser et al. (2012) and Muminović and Pavlović (2012). ROA is the measure of how well a company uses its assets to generate profit. It is widely used because it truly reflects the earnings of the company and reflects how much income is earned through the assets of the company. It provides a long-term view of the performance of the company (Vijayakumar and Devi, 2011) and as such it is the most appropriate proxy for company's profitability in the context of our research.

Several factors of productivity management that could affect company's profitability are considered: *labour cost efficiency*, *labour cost competitiveness*, *capital intensity* and *capital productivity*. Those variables are set as independents in multivariate analysis, and they are selected based on their relevance on previous research results on this topic. According to the OECD Manual - Measuring productivity (2001), productivity is commonly defined *as a ratio of a volume measure of output to a volume measure of input use*. Those authors also emphasise *that there is neither a unique purpose for measurement, nor a single measure of productivity*. The choice between many different productivity measures depends on the purpose of productivity measurement and, in many instances, on the availability of data.

According to Popović and Knežević (2010) cost efficiency can be defined as the share of some costs (or some inputs) or total costs in operating income, or as the share of the cost, input or total costs in total income according to Fitz-Enz (2000). Efficiency is about making the best possible use of resources to improve competitiveness (BBC, 2015). In this case, *labour cost efficiency* is calculated as labour cost divided by operating income, because financial and extraordinary income are not connected with core business. Lower value indicates the higher level of efficiency. *Labour cost competitiveness* is calculated as a ratio of value added and labour cost and it shows the efficiency and effectiveness of the organisation in terms of its labour cost. Higher value of the indicator shows high efficiency and effectiveness accompanied by reasonable wage rates. On the contrary, lower value of the indicator indicates the low levels of efficiency and effectiveness, or high wage

rates do not matched by efficiency and effectiveness. Labour costs include all personnel costs - salaries, wages and employee compensations, divided by the average number of employees. In term of productivity improvements (Latruffe, 2010) *Labour cost efficiency* and *Labour cost competitiveness* have been used as a proxy for efficient use of the existing technology.

C*apital intensity*, calculated as fixed assets divided by number of employees represents the extent to which an organisation is capital-intensive or labour-intensive (www.spring.gov.sg), while *capital productivity* (*Value added/Fixed assets*) reflects the efficiency and effectiveness of fixed assets in the generation of value added. Also, in term of productivity improvements (Latruffe, 2010) C*apital intensity* and C*apital productivity* have been used as a proxy for technological progress.

Besides those individual measures of different aspects of productivity, EBITDA per employee as overall productivity measure is used, similar to Bavorova (2003), Engelhardt (2006), Kale et al. (2007), Wijnands et al. (2008) and Aljinović Barać and Muminović (2013). This type of productivity measurement, according to the OECD Manual (2001), is *easy and readable*.

The variables of size of the company and country have also been used for controlling the productivity management policy. Variable size (LSIZE) is calculated as natural logarithm of total assets and variable country indicates the country in which company operates.

In the first part of the empirical research, univariate analysis (Pearson's correlation) is conducted. After that, OLS regression data analysis as multivariate analysis method is used to test hypotheses about impact of productivity management components as well as overall productivity on company's profitability. The variables of size of the company and country have also been used for controlling the productivity management policy. General form of empirical model is:

$$ROA_{it} = ß_0 + ß_1*PM_{it} + ß_2*LSIZE_{it} + ß_3*C\_CRO_{it} + ß_4*C\_SRB_{it} + ß_5*C\_SLO_{it} + e_{it} \quad (1)$$

Where:

ROA_i = performance measure of profitability of company *i* in year *t*

PM_i = five measures of productivity management of company *i* in year *t*

$LSIZE_i$ = natural logarithm of total assets of the company *i* in year *t*

C_CRO = country in which company *i* in year *t* operates - Croatia

C_SRB = country in which company *i* in year *t* operates - Serbia

C_SLO = country in which company *i* in year *t* operates - Slovenia

e_i = error term of the model.

Namely, PM_i variable displayed in basic form of the model above is changed with its components LABOUR_EFF, LAB_COMP, CAP_PROD, CAP_INTENS and EBITDA_EMP in turn in order to test following statistical hypotheses:

$H_{1.1}$ *...Productivity management component labour cost efficiency has statistically significant negative impact on company's profitability*

$H_{1.2}$ *...Productivity management component labour cost competitiveness has statistically significant positive impact on company's profitability*

$H_{2.1}$ *...Productivity management component capital productivity has statistically significant positive impact on company's profitability*

$H_{2.2}$ *...Productivity management component capital intensity has statistically significant positive impact on company's profitability*

H_3 *... Productivity management comprehensive measure EBITDA per employee has statistically significant positive impact on company's profitability*

The statistical package for social sciences - the PASW v.18.0 - was used for data analyses.

Results and discussion

General findings

Descriptive statistics highlight the average, minimum and maximum values of all variables used in the research and they are shown in the Table 3.

Table 3. Average, minimum and maximum values of variables

Total	N	Minimum	Maximum	Mean	Std. Deviation
ROA	408	-0.75	0.96	0.0512	0.13294
EBITDA_EMP	408	-34823.18	72253.38	7563.69	10684.83183
LABOUR_EFF	408	0.01	17.85	0.1509	0.88143
LAB_COMP	408	-6.74	36.35	1.9737	2.46146
CAP_PROD	408	-1.26	4.58	0.6524	0.59487
CAP_INTENS	408	2478.29	392061.95	42357.91	46240.38251
AVRG_NO_EMP	408	0	1450	128	248.595
SIZE	408	11.4790	19.4974	14.6582	1.8107710
Slovenia					
ROA	66	-0.07	0.19	0.0305	0.04981
EBITDA_EMP	66	-2357.43	40766.00	11893.49	7381.80689
LABOUR_EFF	66	0.04	0.23	0.1201	0.04597
LAB_COMP	66	0.83	3.47	1.6430	0.44480
CAP_PROD	66	0.09	4.58	0.8795	0.87844
CAP_INTENS	66	2478.29	231280.14	67508.00	51336.32503
AVRG_NO_EMP	66	0	634	93	168.625
SIZE	66	11.4790	18.4939	14.3337	2.2724426
Croatia					
ROA	150	-0.53	0.41	0.0218	0.10590
EBITDA_EMP	150	-20381.02	72253.38	8044.70	11972.86935
LABOUR_EFF	150	0.01	0.43	0.1139	0.05887
LAB_COMP	150	-2.00	36.35	2.2045	3.42647
CAP_PROD	150	-0.30	2.61	0.5728	0.50443
CAP_INTENS	150	2810.53	392061.95	54143.80	57438.80693
AVRG_NO_EMP	150	1	1450	143	323.062
SIZE	150	11.8488	19.4870	14.6427	1.9538024
Serbia					
ROA	192	-0.75	0.96	0.0813	0.16228
EBITDA_EMP	192	-34823.18	47129.41	5699.53	10136.54579
LABOUR_EFF	192	0.03	17.85	0.1904	1.28419
LAB_COMP	192	-6.74	10.79	1.9070	1.89740
CAP_PROD	192	-1.26	2.39	0.6366	0.51953
CAP_INTENS	192	2566.30	136910.61	24504.84	20917.62889
AVRG_NO_EMP	192	3	1330	128	199.965
SIZE	192	12.7828	19.4974	14.7820	1.4831310

Source: Estimated according to data from authors' database (2014)

As it can be seen from presented results, average return on asset (ROA) is highest in Serbia (8.13 %), but due to large dispersion between minimum and maximum values. Slovenia has the lowest average return on asset (ROA) (3.05 %) and standard deviation indicates that all data points tend to be close to the expected value. Moreover, all average values of variables are the most representative in Slovenian subsample because of low standard deviation, while the average values of variables in Croatian and Serbian subsamples are not objective as a high standard deviation is a sign that single observations are spread out over a wide range of values.

Univariate analysis

In the first part of the empirical research, univariate analysis is conducted. In order to test hypothesis about statistically significant impact of productivity management on company's profitability, Pearson's correlation coefficients are calculated and the correlation matrix is presented in Table 4.

As it can be seen from the presented results, Pearson's coefficient values indicate moderate positive association between profitability (ROA) and EBITDA per employee (EBITDA_EMP) as productivity comprehensive measure, as well as labour competitiveness (LAB_COMP) and capital productivity (CAP_PROD) that are statistically significant at 0.01 level. Association between profitability (ROA) and labour efficiency (LABOUR_EFF) and capital intensity (CAP_INTENS) is very weak, negative and statistically significant at 0.05 level. Furthermore, strong and positive association between comprehensive measure of productivity (EBITDA_EMP) and component labour competitiveness (LAB_COMP) can be identified, as well as weak correlations with other components of productivity (CAP_PROD and CAP_INTENS) and company size (SIZE). However, according to Shong Chok (2010), a shortcoming of Pearson correlation is that it does not allow identifying causes from consequences. Therefore, a multivariate analysis was also applied.

Multivariate analysis

The results of OLS regression data analyses about impact of productivity management components and overall productivity on company's profitability are presented in the Table 5 below.

Presented results show R value of approx. 0.7, 0.6, 0.6 and R Square value of approx. 0.5, 0.4 and 0.3 in EBITDA per employee (EBITDA_EMP), labour competitiveness (LAB_COMP) and capital productivity (CAP_PROD) models, respectively. It indicates that between 30 % and 50 % of the variance in independent variables are explained by the models so relatively good models fit are indicated. ANOVA regression results indicate that the all tested models are statistically significant (F test 5.003 - 101.83), significant at least at 99 % level. Durbin-Watson tests results show that autocorrelation of residuals is not presented. In addition, in order to detect potential multicollinearity problem among independents, Variance Inflation Factor (VIF) are calculated. VIF values range from 1.005 to 1.246 and suggests that collinearity is not serious issue.

Single analyses about impact of productivity management components and overall productivity on company's profitability show that comprehensive measure of productivity EBITDA per employee

Table 4. Correlation between variables

	ROA	EBITDA per EMP	LABOUR EFF	LABOUR COMP	CAP PROD	CAP INTENS	SIZE
ROA	1	0.593**	-0.132**	0.585**	0.504**	-0.108*	0.012
EBITDA_EMP		1	-0.220**	0.728**	0.213**	0.337**	0.299**
LABOUR_EFF			1	-0.143**	-0.077	0.105*	-0.053
LAB_COMP				1	0.198**	0.151**	-0.009
CAP_PROD					1	-0.395**	-0.156**
CAP_INTENS						1	0.198**
SIZE							1

Note: **Pearson correlation (2-tailed) is significant at the 0.01 level, *at the 0.05 level respectively.
Source: Estimated according to data from authors' database (2014)

Table 5. Impact of productivity management components and overall productivity on company's profitability testing results

Dependent	ROA				
Independents	L_EFF	L_COMP	C_PROD	C_INT	EBITDA_EMP
Constant	0.034 (0.527)	-0.056 (0.192)	-0.129 (0.277)	0.019 (0.722)	0.200 (0.000)
LABOUR_EFF	-0.141 (0.004)	-	-	-	-
LAB_COMP	-	0.596 (0.000)	-	-	-
CAP_PROD	-	-	0.533 (0.000)	-	-
CAP_INTENS	-	-	-	-0.040 (0.464)	-
EBITDA_EMP				-	0.730 (0.000)
LSIZE	-0.009 (0.857)	0.006 (0.871)	0.077 (0.067)	0.008 (0.870)	-0.234 (0.000)
C_SRB	0.230 (0.000)	0.259 (0.000)	0.192 (0.000)	0.210 (0.000)	0.312 (0.000)
C_SLO	0.024 (0.652)	0.075 (0.081)	-0.072 (0.117)	0.029 (0.593)	-0.088 (0.026)
R	*0.257*	*0.632*	*0.561*	*0.218*	*0.709*
R Square	*0.066*	*0.399*	*0.315*	*0.047*	*0.503*
D-W test	*2.025*	*2.055*	*1.887*	*2.003*	*2.121*
F test	*7.110*	*66.902*	*46.389*	*5.003*	*101.83*
Sig.	*0.000*	*0.000*	*0.000*	*0.001*	*0.000*

Source: estimated according to data from authors' database (2014)

(EBITDA_EMP) has statistically significant impact on company's profitability (ROA). The association is positive, indicating that better overall productivity will have positive effect on company's profitability, which is in accordance to our expectations and previous research results, so hypothesis H_3 is accepted. Also, productivity management components labour cost competitiveness (LAB_COMP) and capital productivity (CAP_PROD) have been found statistically significant positive correlated with company's profitability (ROA), which is in accordance with our expectations because high efficiency and effectiveness of the organisation in terms of its labour cost and use of fixed assets in the generation of value added have direct impact on profitability. Therefore, hypotheses $H_{1.2}$ and $H_{2.1}$ are accepted.

Furthermore, productivity management component labour cost efficiency (LAB_EFF) has been found statistically significant negatively correlated with company's profitability (ROA). This finding is consistent with theoretical background and previous research results, because higher level of efficiency indicates lower value of labour cost share in operating income which has direct impact on value added creation. Thus, hypothesis $H_{1.1}$ is accepted, but this finding should be taken with caution, because only 7 % of the variance in independent variable is explained by this model.

Productivity management component of capital intensity (CAP_INTENS) has not statistically significant impact on company's profitability (ROA), so hypothesis $H_{2.2}$ is rejected. This is not consistent with theoretical background and previous research results, but can be explained with low model R (0.218) and R Square (0.047) values, which indicates that only 5 % of the variance in independent

variables are explained by the model so relatively poor model fit is indicated. Moreover, results of Aljinović Barać and Muminović (2013) previous research show that companies with higher level of capital investments per employee obtain lower financial performance measured by return on assets. Authors found possible explanation *in time lag between the moment of investment and the moment in the future when investment will generate the profit. Also, it is possible that companies use upward revaluation accounting policy in recognition and measurement of fixed assets, which negatively impact the value of return on assets because the amounts of equity and asset are increasing (Aljinovic Barac and Sodan, 2011). Also, profits are lower because of the increased future depreciation cost caused by boosted (revalued) amount of fixed asset* (Aljinović Barać and Muminović, 2013). The same sense can be applied in explanation to insignificant impact of capital intensity on company's profitability.

Finally, the variable of size (SIZE) of the company which has been used for controlling the productivity management policy is not found statistically significant, except for the overall productivity (EBITDA_EMP). Serbia as country in which company operates is statistically significant while Slovenia and Croatia are not found statistically significantly correlated with the productivity and profitability of companies in dairy processing industry.

Conclusions

This paper provides insights into productivity in dairy processing companies in Slovenia, Croatia and Serbia in order to investigate do labour cost efficiency, labour cost competitiveness, capital intensity and capital productivity positively as well as EBITDA per employee as measure of overall productivity affect company's profitability.

Since the productivity is identified as a factor that can influence the competitiveness of the EU dairy industry in strategic EU documents, this research confirms that thesis in the context of profitability growth. Our results show that comprehensive measure of productivity EBITDA per employee and productivity management components labour cost competitiveness and capital productivity have positive impact on company's profitability. These findings indicate that high efficiency and effectiveness of the organisation in terms of its labour cost and use of fixed assets in the generation of value added have direct impact on profitability. Furthermore, better overall productivity will positively affect company's profitability. Thus, efficient use of existing technology is the key to increase productivity and consequently profitability. As was already proven in our previous research, all these companies in countries observed are considered as small players in the dairy sector at the common EU market. However, *it cannot be ruled out that they will have difficulties in competing with the big dairy processing multinational companies* (Aljinović Barać and Muminović, 2013).

Summarizing theoretical and empirical results of the research, the following trends and scenarios can be expected: (1) With existing level of competition in dairy processing industry, the possibility of increase in overall productivity will be crucial factor of profitability improvement in observed countries; (2) Enhancements in productivity management are important no matter of size and country, so each company should find the best way to increase productivity with available internal resources and in given economic surrounding; (3) Labour cost efficiency has been found statistically significant negatively correlated with company's profitability, but this finding should be taken with caution, because of poor model fit. However, it also implicate that the low price of the labour is not key factor for successful business but the efficient use of the existing capacity. Namely, although lowering of labour costs is necessary to increase the productivity, in the case of inefficient usage of capacities that relation will be lost due to existence of fixed costs. In observed countries that decrease in labour force was 6 %, 9 % and 2 % in Slovenia, Croatia and Serbia, respectively.

Lastly, some recommendations to future researchers could be derived. They should expand the spatial framework of the research and investigate those relations on EU level, or deepen the analysis with inclusion of more qualitative and quantitative factors that drive productivity growth.

Utječe li produktivnost na profitabilnost poduzeća u industriji prerade mlijeka? Iskustva Slovenije, Hrvatske i Srbije

Sažetak

Ovaj rad pruža uvid u produktivnost poduzeća iz industrije prerade mlijeka u Sloveniji, Hrvatskoj i Srbiji, kako bi se utvrdilo postoji li pozitivan utjecaj ukupne produktivnosti, produktivnosti rada te produktivnosti kapitala na profitabilnost. Pregled dosadašnje literature pokazuje kako je ova problematika bila prilično zapostavljena, iako je povećanje produktivnosti i u najrazvijenijim zemljana naglašeno kao najznačajniji čimbenik u održavanju konkurentske prednosti. Istraživanjem je dokazan pozitivan utjecaj produktivnosti na profitabilnost, pri čemu je produktivnost mjerena sveobuhvatnom mjerom EBITDA po zaposlenom, te parcijalnim mjerama troškovna konkurentnost rada i kapitalna produktivnost.

Ključne riječi: industrija prerade mlijeka, profitabilnost, produktivnost, troškovna učinkovitost, troškovna konkurentnost

References

1. Agency of the Republic of Slovenia for Public Legal Records and Related Services, www.ajpes.si (accessed: July, 01, 2013).
2. Aljinović Barać, Ž., Muminović, S. (2013): The impact of capital investments on dairy processing industry features: evidence from Slovenia, Croatia and Serbia, *Mljekarstvo 63* (3), 140-149.
3. Aljinović Barać, Ž., Šodan, S. (2011): Motives for Asset Revaluation Policy Choice in Croatia, C*roatian Operational Research Review(CRORR) 2* (1), 60-71.
4. A Guide to Productivity Measurement, SPRING Singapore, www.spring.gov.sg (accessed: June, 15, 2013)
5. Amato, L., Wilder, R.P. (1985): The effects of firm size on profit rate in U.S. manufacturing. *Southern Economics Journal 52*, 181-190. doi: 10.2307/1058913
6. Asimakopoulous, I., Samitas, A., Papadogonas, T. (2009): Firm-specific and economy wide determinants of firm profitability Greek evidence using panel data, *Managerial Finance 35*, 930-939. doi: 10.1108/03074350910993818
7. Bavorova, M. (2003): Influence of policy measures on the competitiveness of the sugar industry in the Czech Republic, *Agricultural Economics - Czech 49* (6), 266-274.
8. BBC (2015). Business Studies, Production, Efficiency. http://www.bbc.co.uk/schools/gcsebitesize/business/production/breakevenanalysisrev1.shtml (accessed: January, 12, 2015)
9. Croatian Financial Agency (FINA), www.fina.hr (accessed: July, 01, 2013).
10. Croatian National Bank, www.hnb.hr (accessed: July, 01, 2013).
11. Dahl, A., Leith, R., Gray, E. (2013): Productivity in the broadacre and dairy industries. *Agricultural commodities* 3 (1), 201-220.
12. Engelhardt, A. (2006): The 3/2 rule of employee productivity. CYBAEA Journal, http://www.cybaea.net/Blogs/Journal/employee_productivity.html (accessed: January, 18, 2013)
13. European Commission (2013): EU Dairy farms report 2012. Directorate L. Economic analysis, perspectives and evaluations. http://ec.europa.eu/agriculture (accessed: February, 18, 2014)
14. Farrel, D. (2003): Improving European Competitiveness MGI Perspective. McKinsey Global Institute.
15. http://www.mckinsey.com/insights/europe/improving_european_competitiveness (accessed: December, 9, 2012)
16. Fitz-Enz, J. (2000): *The ROI of Human Capital - Measuring the Economic Value of Employee Performance*. Amacom, New York
17. Fitzsimmons, J.R., Steffens, P.R., Douglas E.J. (2005): Growth and Profitability in Small and Medium Sized Australian Firms. *AGSE Entrepreneurship Exchange*, Melbourne, February 2005. doi: 10.2139/ssrn.1263734
18. Gardebroek, C., Kedir N.T., Wijnands, J.H.M. (2010): Growth dynamics of dairy processing firms in the European Union, *Agricultural Economics 41* (3-4), 285-291. doi: 10.1111/j.1574-0862.2010.00447.x
19. Glancey, K. (1998): Determinants of growth and profitability in small entrepreneurial firms. *International journal of Entrepreneurial Behavior and Research 4* (1), 18-27. doi: 10.1108/13552559810203948
20. Gulan, B. (2014): Kako podići kvalitet mleka u Srbiji. Privredna komora Srbije, privredne vesti, 24. januar. http://www.pks.rs/Vesti.aspx?IDVestiDogadjaji=10741 (accessed: March, 25, 2015)
21. European Union Dairy Sector (2010): IUF Dairy Industry Research. http://cms.iuf.org/sites/cms.iuf.org/files/European%20Union%20Dairy%20Industry.pdf (accessed: December, 13, 2014)
22. Eurostat, www.eurostat.eu (accessed: July, 01, 2013).

23. Irz, X., Kuosmanen, N. (2014): Productivity of Dairy Supply Chains: A Comparative Analysis across the Countries of the Baltic Sea Region. Maataloustieteen Päivät 2014. http://www.smts.fi/MTP_julkaisu_2014/Esitykset/Irz_Kuosmanen_Productivity_of_Dairy_Supply_Chains_A_Comparative_Analysis.pdf (accessed: January, 13, 2015)
24. Jansik, C. (2009): A Comparison of Dairy Supply Chains in Finland and in the Baltic Countries. IAMA Symposium 2009, Budapest. http://www.eoq.hu/iama/conf/1077_paper.pdf (accessed: September, 09, 2014)
25. Kale, J.R, Ryan, H.E., Wang, L. (2007): Debt as Bonding Mechanism: Evidence from the Relations between Employee Productivity, Capital Structure and Outside Employment Opportunities,
26. http://www.atl-res.com/finance/Kale-Ryan-Wang.pdf (accessed: January, 13, 2013)
27. Krugman, P. (1992): *The Age of diminished expectations*, U.S.A.: MIT Press.
28. Kouser, R., Bano, T., Azeem, M., Masood-ul-Hassan (2012): Inter-Relationship between Profitability, Growth and Size: A Case of Non-Financial Companies from Pakistan, *Pakistan journal of commerce and social sciences 6* (2), 405-419.
29. Latruffe, L. (2010): Competitiveness, Productivity and Efficiency in the Agricultural and Agri-Food Sectors, OECD Food, Agriculture and Fisheries Papers, No. 30, OECD Publishing. http://dx.doi.org/10.1787/5km91nkdt6d6-en (accessed: December, 13, 2012) doi: 10.1787/5km91nkdt6d6-en
30. Lukač Havranek, J., Bosnić, P. (2000): Stanje, razvoj i budućnost mljekarstva Hrvatske. *Mljekarstvo 50* (4), 305-323.
31. Meen, D.E. (2003): Turkey: Making the productivity and growth breakthrough. McKinsey Global Institute
32. http://www.mckinsey.com/insights/europe/turkey_making_the_productivity_and_growthbreakthrough (accessed: April, 01, 2014)
33. McKenzie, J. (2013): Overview of the NSW Dairy Industry 2013, John McKenzie & Associates Consulting, Orange, NSW, Department of Primary Industries. http://www.dpi.nsw.gov.au/agriculture/livestock/dairy-cattle (accessed: April, 01, 2014)
34. McGrattan, E.R., Prescott, E.C. (2012): The Labor Productivity Puzzle. Working Paper 694, Federal Reserve Bank of Minneapolis. http://www.minneapolisfed.org/research/wp/wp694.pdf (accessed: April, 01, 2014)
35. Muminović, S., Pavlović, V., Joksimović, D. (2012): Profitability and Business Excellence Analysis of Dairy Industry in Serbia, *Mljekarstvo 62* (3), 207-218.
36. Muminović, S., Pavlović, V. (2012): Profitability of Dairy Industry in Slovenia, Croatia and Serbia, *Mljekarstvo 62* (2), 96-110.
37. National Bank of Serbia, www.nbs.rs (accessed: July, 01, 2013).
38. OECD (2001)*: Measuring Productivity, OECD Manual - Measurement of Aggregate and Industry-Level Productivity Growth*. OECD, Paris, www.sourceOECD.org (accessed: May, 19, 2014)
39. Philippot, A., Aguilar, F., Zou, L. Gupta, N., Liu, Z. (2011): Competitiveness Analysis of The Netherlands and the Dutch Dairy Cluster. http://www.isc.hbs.edu/resources/courses/moc-course-at-harvard/Documents/pdf/student-projects/Netherlands_Dairy_2011.pdf (accessed: May, 19, 2014)
40. Popović, R., Knežević, M. (2010): Dinamika troškova prerade mleka u Srbiji, *Prehrambena industrija 21* (1-2), 9-16.
41. Serbian Business Registers Agency, www.apr.gov.rs (accessed: July, 01, 2013).
42. Shong Chok, N. (2010): Pearson's versus Spearman's and Kendall's correlation coefficients for continuous data. Master of Science Thesis, University of Pittsburgh, Graduate School of Public Health.
43. Subbaiah, K. Venkata; Rao, K. Narayana; Babu, K. Nookesh (2009). Supply Chain Management in a Dairy Industry - A Case Study. World Congress on Engineering 2009 (Volume 1); 2009
44. http://connection.ebscohost.com/c/articles/51196613/supply-chain-management-dairy-industry-case-study (accessed: May, 19, 2014)
45. Swinnen, J.F.M., Dries, L., Noev, N., Germenji, E., (2006): Foreign Investment, Supermarkets, and the Restructuring of Supply Chains: Evidence from Eastern European Dairy Sectors. Available at SSRN: http://ssrn.com/abstract=881731 or http://dx.doi.org/10.2139/ssrn.881731 (accessed: December, 13, 2012) doi: 10.2139/ssrn.881731
46. Tacken, G.M.L., Banse, M., Batowska, A., Gardebroek, C., Nesha Turi, K., Wijnands, J.H.M., Poppe, K.J. (2009): Competitiveness of the EU dairy industry. LEI Wageningen UR, The Hague. http://www.alimentaonline.ch/Portals/0/Wettbewerbsf%C3%A4higkeit_europ_Milchindustrie.pdf (accessed: May, 19, 2014)
47. Urad RS za makroekonomske analize in razvoj - UMAR (2008). Ekonomsko ogledalo, 1. http://www.umar.gov.si/fileadmin/user_upload/publikacije/eo/2008/og0108/eo0108.pdf#15 (accessed: March, 25, 2015)
48. Van Berkun, S. (2009): An Assessment of the Competitiveness of the Dairy supply Chain in New Member States, Candidate and Potential Candidate Countries. AgriPolicy, Enlargement Network for Agripolicy Analysis,http://www.euroqualityfiles.net/AgriPolicy/Report%202.1/AgriPolicy%20Synthesis%20report%20Dairy%20Chain%20Analysis%20May%202009.pdf. (accessed: December, 11, 2012)
49. Vijayakumar, A., Devi, S.S. (2011): Growth and profitability in Indian Automobile Firms - An analysis, *Journal for Bloomers of Research 3* (2), 168-177.
50. Wijnands, J., Bremmers, H., van der Meulen, B., Poppe, K. (2008): An economic and legal assessment of the EU food industry`s competitiveness, *Agribusiness 24* (4), 417-439. doi: 10.1002/agr.20167