

# Competitiveness of the Czech food industry

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**Abstracts:** The study is engaged in the problems of competitiveness and the performance of the Czech food industry. Both these attributes are evaluated in the framework of the domestic manufacturing sector and market, as well as from the point of view of the relations in foreign trade, that means in context with the European and world market. The study applies in the frame of methodology the economic model based on input-output analysis in CZ conditions. In majority of assessed indicators, there were used databases from 2000–2008, i.e. the period before and after the accession to the EU. The outcome of the study is the evaluation of the situation in the macroeconomic environment that influences food sector and the use of input and output in this sector. The SWOT analysis shows, among other, the occasions that could improve the current stagnant or rather decreasing situation of competitiveness of the assessed sector. The study also indicated new directions of the further development in this area. The analysis of the food sector development demonstrated that the sector competitiveness is not in a critical situation. However, the sector competitiveness assessed by the RCA index and foreign trade is not going to be improved. The stagnation has come. As it follows from the SWOT analysis, the reason is that the opportunities of the sector are not fully utilised. Food producers are facing the basic problems in the output sphere mainly in the domestic market. Above all, it is necessary to strengthen marketing with regard to improving the Czech products competitiveness.

**Key words:** food industry, input, output, competitiveness, performance, market

The problematic of competitiveness of the Czech food sector had been solved before the entrance of the CR to the EU. After the CR entrance in the EU, the country was found in new conditions of the EU unified market. It was the reason for classifying the ability of competitiveness and efficiency of the Czech food sector, for using the available databases and selecting the appropriate economic model leading to the objective conclusions, following the SWOT analysis and demonstrating the bases for further research.

## MATERIAL AND METHODS

The scale of indicators used for the competitiveness measurement and evaluation is wide and differentiated.

Eiteljörge and Hartmann (1999) used as measure for the competitiveness indicators. Vokorosová (2003) used revealed comparative advantage (RCA index) as indicator of SR competitiveness.

Matošková and Gálik (2009) used for evaluation of the selected aspects of internal and external competi-

tiveness of Slovak agriculture and food products the market segmentation into prices and quality sensitive markets, plus the products breakdowns into four segments. This method defines the products contributing to the positive balance of trade. According to Božík et al. (2009) productivity of labor from value added belongs to important indicator of competitiveness.

As to LEI (Galen 2009) and other sources, it is possible to divide indicators to the following groups:

- macroeconomic indicators and aspects creating the benefitting background (GDP, inflation rate, total food consumption, legislative framework etc.),
- indicators regarding resources, inputs (infrastructure—number of employees and expenditures for the R&D, investments, labour economics, capital),
- indicators of outputs (production, foreign trade, the RCA index, value added, labour productivity).

Data evaluation for the period 2000–2008 (if data were available) was the base for the comparative and trend analyses (Plášil and Mezera et al. 2010). According to Burianová (2010) the Michaely Index that shows the specific measure of specialization for export.

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Table 1. Number of the R&amp;D workplaces by the CZ-NACE of the business enterprise sector

NACE	Industry title (adapted)	2001	2005	2006	2007	2008
15–37	Manufacturing total	509	858	965	980	1 017
15–16	Food, beverages and tobacco industry	19	39	52	51	59

NACE = Nomenclature statistique des activités économiques dans la Communauté européenne (The Statistical Classification of Economic Activities in the European Community)

Source: CZSO

Table 2. Total internal business enterprise expenditures on the R&amp;D by industries (economic activity) – CZ-NACE in mill. CZK

NACE	Industry title (adapted)	2000	2005	2006	2007	2008
15–37	Manufacturing total	10 601	17 145	21 952	20 512	20 876
15–16	Food, beverages and tobacco industry	88	136	193	211	316

Source: CZSO

## RESULTS AND DISCUSSION

### Macroeconomic background

- The CR food market is not so wide from the point of view of **international competitiveness and the comparison** with some EU countries and it cannot be compared with the big world countries. Domestic food firms are limited mainly as to production capacity and they could not exploit more the advantages of the action range. The domestic market should be mainly limited by the EU unified market. The main problem is that the EU market is not quite unified and there do not exist tariff barriers and different specifics on the national markets.
- The basic indicator of national economy is **GDP**. Czech food, beverages and tobacco industry (according to the National Accounts Statistics, counted from the gross value added in c.p.) had shared in the GDP by 2.7% (2007) and 2.9% (2008), it there-

fore presents an important source of GDP (CZSO 2009).

- **Inflation rate** measured by the average consumer prices had fluctuated and it had influenced the connections in food chain. In 2003, the inflation rate represented 0.1% and it increased to 6.3% in 2008 (CZSO 2009),
- **Total food consumption** expressed in constant prices stagnated in 2008 (the qualified estimation of the ÚZEI). The consumption of food of animal origin increased in 2008 by about 0.8% in comparison with 2007 and the consumption of food of plant origin decreased in the same period by about 1.0%.
- **Legislation, standards** required by the EU were connected with the demanding investment activities.
- **Programs and supports** from the EU funds and the national supports reduced the high investment demands connected with the legislation requests and technological demand, innovation etc.

Table 3. Support for the R&amp;D from the state budget, 2000–2007

	2000	2001	2002	2003	2004	2005	2006	2007
Share of MoA on R&D support from the governmental funds (%)	3.80	3.77	4.12	4.18	4.53	4.40	4.23	3.84

Source: Ministry of Agriculture, Research, Education and Consultancy Department

Table 4. Total Intramural Business Enterprise Expenditure on R&amp;D by Industries (economic activity) – CZ-NACE (year-on-year index)

NACE	Industry title (adapted)	2000	2005	2006	2007	2008
15–37	Manufacturing total	–	125	128	93	102
15–16	Food, beverages and tobacco industry	–	89	142	109	150

Source: CZSO

Table 5. Development of number of researchers in the Business Enterprise sector by CZ-NACE – year-on-year index (%)

NACE	Industry title (adapted)	2000	2005	2006	2007	2008
15–37	Manufacturing total	–	107	115	106	104
15–16	Food, beverages and tobacco industry	–	98	119	119	126

Source: CZSO

## Input factors

### *Basic indicators of the R&D*

*Number of the R&D workplaces* in the business sector, which is the most important financial source of the R&D in the Czech food industry, increased significantly in the period 2000–2008, from 19 to 59 statistical units. This positive trend documents the possibilities of increasing competitiveness of food industry (Table 1).

The business sector represented the main source of the CR food industry, beverages and tobacco industry R&D financing in the year 2008, as in the previous monitored years. The share of this sector in the year 2008 represented 92.7%. The second main financial source for the R&D in 2008 for food industry was presented by the governmental funds (the Ministry of Agriculture 7.3%) aimed at the food R&D, mainly at food quality and safety. (Tables 2 and 3). As mentioned, the increase of the governmental financial sources for the food R&D, mainly for innovation, could help to strengthen the sector competitiveness.

Business expenditures of the food sector are very low in comparison with other industrial sectors, but in the recent years, there can be registered a reasonable increase (Table 4).

Table 5 documents the progress of the food R&D employee's number. The increase of the R&D employees' number, especially from the scientific field, should help to strengthen the cooperation between the academic science and the manufacture of food

products. The main aim should be the increase of the production value added.

### *Investments*

#### *Acquisition of new machinery and equipment*

Investments are aimed at the creation of a certain property portfolio. The acquisition of new machinery and equipment appears as the main basis for production. The year-on-year index of the acquisition of new machinery and equipment is documented in Table 6.

The amount of the acquisition of new machinery and equipment for food industry represented 12.5 bill. CZK in 2007. The development of this indicator can be characterized as unequal. The food, beverages and tobacco industry shared by 7.2% in this indicator for processing industry as a whole in 2007.

### *Labour economy*

#### *Number of employees*

Food and drink industry is the leading employer in 2007 processing industry in the EU (4.4 million people in 2008). The number of employees increased in 2008 EU by about 0.8% in comparison with 2007 (CIAA 2009).

The share of in 2007 employee's number of the Czech food industry is then decreasing (2007), but this share increased in 2008 to the 2004 level (9.4%). This share is, according to available data in the CR, lower in comparison with the EU 27 (Table 7).

Table 6. Acquisition of new machinery and equipment (year-on-year index)

NACE	Industry title (adapted)	2001	2005	2006	2007
15–37	Manufacturing total	–	123.91	98.92	114.68
15–16	Food, beverages and tobacco industry	–	114.32	110.17	100.66

Source: CZSO

Table 7. Share of employees number – food industry 2004–2008

Share food industry on manufacturing industry (%)	2004	2005	2006	2007	2008
EU 27	13.4	13.5	13.5	13.5	13.5
CR	9.4	9.3	9.2	9.1	9.4

Source: Eurostat, CZSO

Table 8. Number of employees 2000–2008, CZ-NACE 15

	2000	2001	2002	2003	2004	2005	2006	2007	2008
Number of employees	144 350	143 142	141 199	138 716	135 238	134 433	126 466	127 981	128 102
Year/year index	–	99.2	98.6	98.2	97.5	99.4	94.1	101.2	100.1
Commuted index	100.0	99.2	97.8	96.1	93.7	93.1	87.6	88.7	88.7

Source: CZSO

Table 9. Share of the personnel costs in value added in c.p., 2000–2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008*
NACE 15	0.527	0.515	0.521	0.525	0.517	0.508	0.509	0.504	0.499

\*preliminary value

Source: CZSO, own calculation

Table 10. Consumption for operation 2000–2008 (mill. CZK)

	2000	2001	2002	2003	2004	2005	2006	2007	2008*	Index 08/00
NACE 15	200 886	218 451	220 084	212 356	229 008	221 956	221 452	235 892	251 276	125.1
Manufacturing industry	1 376 286	1 543 102	1 564 071	1 647 822	1 955 217	2 095 734	2 405 527	2 607 999	2 587 284	188.0

\*preliminary value

Source: CZSO, own calculation

The number of in 2008 total NACE 15 employees as well as of all dominant food industry branches had been decreasing in period 2000–2008. The total decrease of the employee's number was by about 11.3%, though the fact is that employee's number has slightly increased during the last two years (Table 8). This change is the result of a higher employment in the NACE: feed industry and other food products.

Differences among the regions were also registered. The improvement or maintenance of the demograph-

ical situation of the particular parts of a region is subject to the good life and work conditions in the area, respective municipalities (Svatošová 2008).

#### *Share of personnel costs on value added*

The share of the personnel costs in the value added in period 2000–2008 of CZ-NACE 15 was decreasing (Table 9).

As it is documented in Table 9, there is a significant tendency to reduce the share of the personnel costs

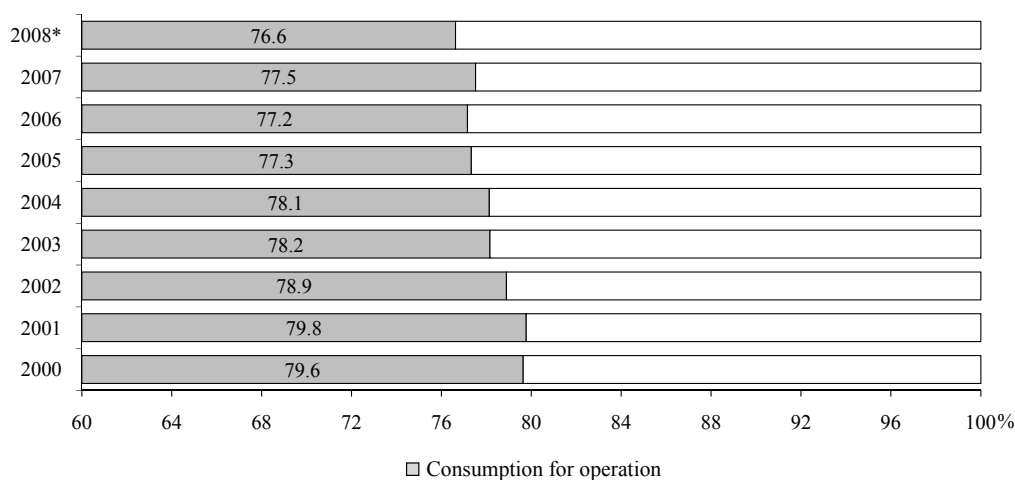


Figure 1. Share of consumption for operation in the total outputs including business margin, NACE 15, 2000–2008 (total outputs including business margin = 100%)

\*preliminary value

Source: CZSO, own calculation

Table 11. Gross fixed capital (mill. CZK)

NACE	2000	2001	2002	2003	2004	2005	2006	2007*
Manufacturing total	2 098 930	2 262 704	2 329 863	2 468 131	2 655 903	2 788 753	2 941 991	3 153 160
Food, beverages and tobacco industry	274 733	290 430	300 533	313 653	337 495	351 299	368 975	389 046
Share of Food, beverages and tobacco industry on Manufacturing total	13.1	12.8	12.9	12.7	12.7	12.6	12.5	15.9

\*preliminary value

Source: CZSO, own calculation

Table 12. Net fixed capital (mill. CZK)

NACE	2000	2001	2002	2003	2004	2005	2006	2007*
Manufacturing total	1 270 716	1 372 741	1 425 099	1 503 207	1 612 327	1 678 161	1 751 376	1 865 606
Food, beverages and tobacco industry	159 477	168 673	174 147	184 032	199 442	206 383	216 244	226 478
Share of Food, beverages and tobacco industry on Manufacturing total	12.6	12.3	12.2	12.2	12.4	12.3	12.3	12.1

\*preliminary value

Source: CZSO, own calculation

in the value added and the endeavour of financial savings in connection with the number employees' reduction.

### **Consumption for operation**

Table 10 describes that the food industry consumption for operation had increased in 2000–2008 more slowly (125.1%) than in the total manufacturing industry (188.0%). As important factors negatively influencing the food industry consumption for operation, it is possible to mark the increasing costs for energy, transport and other inputs.

As it follows from the development of the consumption for operation in 2000–2008, the costs for food production would increase in the following years. It will be the main reason for decelerating the efficiency of food industry and its competitiveness.

Figure 1 illustrates the share of consumption for operation in the total outputs including the profit margin in the period 2000–2008.

### **Capital**

The evaluated subject was the fixed capital as the key production factor. Table 11 documents the continuous increase of the gross fixed capital in the total amount, the share of this sector in the manufacturing sector total is increasing.

The analogical development can be followed regarding the net fixed capital (Table 12).

### **Output factors**

#### **Production**

There are forthcoming changes mainly in the production structure in the sector and branch structure.

Table 13. Receipts for own sales of products and services in c.p. in 2000–2008 (mill. CZK)

	2000	2001	2002	2003	2004	2005	2006	2007	2008*
NACE 15	239 549.6	258 242.8	262 480.7	257 113.1	276 222.1	270 838.1	273 615.5	296 065.6	310 169.9
Year-on-year index	–	107.8	101.6	98.0	107.4	98.1	101.0	108.2	104.8
Cumulative index	100	107.8	109.6	107.3	115.3	113.1	114.2	123.6	129.5

\*preliminary value

Source: CZSO, own calculation

Table 14. Index of food, beverages and tobacco production (2000 = 100)<sup>1</sup>

Country	2001	2002	2003	2004	2005	2006	2007
EU 27	101.3	103.7	104.7	105.8	107.9	109.6	111.5
EU 15	101.1	103.3	103.9	104.8	106.9	108.5	110.2
Belgium <sup>2</sup>	104.8	109.5	113.2	118.6	120.5	125.3	131.6
Bulgaria	96.1	96.5	113.9	131.4	138.0	136.6	152.2
Czech Republic	101.8	103.5	103.6	102.1	100.8	102.5	104.1
Denmark	99.9	107.4	114.1	110.6	109.8	111.0	118.7
Estonia <sup>3</sup>	111.0	113.4	116.6	121.8	128.3	136.7	140.6
France	101.1	103.5	102.4	102.2	102.2	103.7	106.1
Italy	103.1	104.3	106.8	105.3	107.0	108.0	106.9
Cyprus	104.9	105.9	106.5	103.5	103.8	96.1	98.0
Lithuania	102.4	100.0	108.6	112.8	125.5	143.8	164.4
Latvia <sup>3</sup>	109.0	117.5	120.3	127.0	133.5	139.3	137.7
Luxemburg <sup>3</sup>	113.1	115.2	112.8	115.8	124.4	117.5	118.7
Hungary	99.5	101.0	99.5	95.1	90.2	91.9	88.6
Germany	99.3	99.9	99.7	100.5	104.7	106.6	109.0
Netherlands	100.1	102.5	101.8	102.7	106.8	109.3	110.6
Poland	103.6	106.7	111.6	117.2	124.6	133.5	142.0
Portugal	102.2	105.1	104.6	107.3	107.2	111.0	116.2
Austria	101.5	104.8	105.2	106.1	108.7	113.8	116.3
Romania	121.1	133.6	139.8	133.6	138.3	158.9	174.0
Greece	102.1	104.2	101.5	105.7	103.9	105.6	109.4
Slovakia	101.2	106.2	103.0	101.6	100.8	101.2	101.1
United Kingdom	100.6	103.3	104.4	106.5	108.1	107.5	107.0
Spain <sup>3</sup>	100.0	104.5	106.9	108.4	110.5	110.2	109.8
Sweden	104.0	100.3	95.5	95.2	95.1	95.9	95.5

<sup>1</sup>cleansed of number of working days influence, <sup>2</sup>preliminary value, <sup>3</sup>estimation

Source: CZSO, Eurostat, 22/09/2008

With regard to the relatively saturated food market in the conditions of the CR, the fluctuation of producers' prices and the pressure of the retail chains impacts the prices maintenance on the level of the sector and branches.

The basic production characteristic according to the receipts for own sales of products and services of the NACE 15 in the period 2000–2008 is presented in Table 13. It documents the increasing development trend of this indicator. The cumulative index for the

Table 15. Development of Foreign Trade Commodities Balance (in c.p.)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	Index 08/00
Export total (mill. CZK)										
CPK 15	32 329.30	37 744.90	34 402.30	36 895.50	47 569.90	55 052.70	59 043.00	69 066.80	74 166.00	229.4
Year-on-year index	–	116.8	91.1	107.2	128.9	115.7	107.2	117	107.4	–
Import total (mill. CZK)										
CKP 15	44 210.10	47 645.00	48 105.40	52 240.10	65 372.60	73 359.50	80 401.60	94 139.70	97 898.50	221.4
Year-on-year index	–	107.8	101	108.6	125.1	112.2	109.6	117.1	104	–
Balance (mill. CZK)										
CPK 15	–11 880.80	–9 900.10	–13 703.10	–15 344.60	–17 802.70	–18 306.80	–21 358.60	–25 072.90	–23 732.50	199.8

Source: CZSO, MIT calculation

Table 16. RCA index of food industry compared to the foreign trade of the CR

	2000	2001	2002	2003	2004	2005	2006	2007	2008*
RCA	0.81	0.87	0.76	0.74	0.74	0.73	0.72	0.71	0.74

\*preliminary value

Source: CZSO, own calculation

monitored period increased to 129.5. This trend illustrates the long-term increase of the food industry performance as a whole. The growth of performance could be positive in terms of competitiveness.

As it from Table 14 (index of food, beverages and tobacco production), the CR reached a lower index than the EU 15 as well as the EU 27 in monitored period. Indeed, there is a noticeable trend of the food production increase, but the CR is lagging being behind the EU.

There are strengthening the pressures in the EU to promote the agricultural products quality in the supply chains. It should be considered as a very important factor of competitiveness.

#### Foreign trade

The turnover of the CR foreign trade with food and beverages commodities (CPA 15) has mostly doubled in the period 2000–2008. The development of the foreign trade balance documents the constantly downgrading trend. The balance of the foreign trade (export and import) increased more than double in the monitored period. The development of the trade balance (Table 15) recorded a permanent decline in the period 2002–2007. The foreign trade balance was minus 25 bill. CZK. The amount of the passive balance decreased by about 1.4 bill. CZK to in 2008 level – 23.7 bill. CZK in 2008. The reason for the passive balance of the NACE 15 products increase is the prevalence of import to export.

#### RCA index

This indicator expresses the expert performance of the particular branch (in this case CZ food industry) to the performance of the CZ economy in total.

The RCA index (Revealed Comparative Advantage) indicates relation:

$$RCA = (x_i/y_i)/(X/Y)$$

where:

$x_i$  = export of  $i$  branch

$y_i$  = import of  $i$  branch

$X$  = sector

$Y$  = sector

The comparative advantage of the Czech food industry in relation to the foreign trade of the CR was not improved in the period 2000–2008. This indicator reached the highest level in 2001 (0.87) and it is fluctuating about the average value 0.74 (Table 16).

#### Value added

The share of the food industry in the manufacturing industry total kept (with some small fluctuation) a relatively stable position in 2000–2008 (Table 17).

The sector NACE 15 reached, regarding the value added (in c.p.), a substantially higher growth rate in comparison with returns for own sales and services (in c.p.) in the monitored period. The cumulative index recorded the value 149.3 in 2008; the year-on-year index was 7.5%.

#### Labour productivity from value added

Labour productivity from value added of the Czech food industry in the monitored period recorded a progressive trend (Table 18). The year-on-year index of more than 7% was reached in last three years. All branches of the food industry participated in this progress.

Table 17. Value added in 2000–2008 (mill. CZK)

NACE	2000	2001	2002	2003	2004	2005	2006	2007	2008*
Manufacturing total	481 400	532 938	534 913	575 964	654 543	670 779	751 201	822 399	805 201
Food, beverages and tobacco industry	51 346	55 407	58 900	59 333	64 117	65 056	65 541	71 279	76 649
Share of Food, beverages and tobacco industry on Manufacturing total	10.70	10.40	11.00	10.30	9.80	9.70	8.70	8.70	9.50

\*preliminary value

Source: CZSO, own calculation

Table 18. Labour productivity from value added in c.p. in 2000–2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008*
NACE 15	355.7	387.1	417.1	427.7	474.1	483.9	519.3	556.9	598.3
Year-on-year index	x	108.8	107.8	102.5	110.8	102.1	107.1	107.5	107.4
Cumulative index	100	108.8	117.3	120.2	133.3	136	145.7	156.6	168.2

\*preliminary value

Source: CZSO, own calculation

The performance of labour market together with its consequences (changes in employment, wages and labour productivity) is regarded as one of the major economic problems of the present time (Bielik and Rajčanová 2008).

In the international comparison with the EU (data of the EUROSTAT), labour productivity from value added per 1 employee (in c.p., 2006) in the CR achieved the value 20 ths EURO, while the average of the EU 27 was 43 ths EURO. The Czech Republic had attained 38% of the EU 15 level. The comparison of the CR with the EU 12 countries is more positive (the index is 122).

### SWOT analysis

SWOT analysis of the Czech food industry is based on the data evaluation of the monitored spheres (inputs, outputs and macroeconomic background) from the point of view of competitiveness. The expectations for the further development were appraised with regard to the contemporary economic crisis.

#### *Opportunities for increasing the food industry competitiveness*

##### **Input factors**

- increase of the business expenditures for the R&D and a higher qualification of the R&D employees will support innovation of the production structure for the benefit of the modern consumption trends,
- increase for the investments intensity in new machinery and equipment,
- continuous advancement of the employees qualification skill,
- increase of the gross fixed capital in the sector provided its more effective exploitation.

##### **Output factors**

- restoration of the advancing trend of the sector performance mainly in the decisive production branches as the base for their competitiveness strengthening,
- stimulation of the value added of the sector mainly in the decisive branches on the base of the returns for own sales of products and services.

#### **Macroeconomic background**

- growth of the total food consumption,
- investment activities support.

#### *Threats for the food industry competitiveness*

##### **Input factors**

- low competitiveness as a result of the insufficient financial means for the R&D,
- disproportional reduction of the consumption for operation in the sector creates the risk for extending the standard production and reducing the high quality production,
- risk of insufficient capitalization.

##### **Output factors**

- domestic production displacements by import on account of its low competitiveness.

#### **Macroeconomic background**

- slow diversion of the economic recession and its economic impact on the household consumption and business.

### CONCLUSIONS

The economic model (input, output and macroeconomic background) was used for the assessment of the trend development and comparison of the monitored food and beverages sector from the competitiveness point of view. Presumptions for the next development were evaluated.

The analysis of the food sector development in the period 2000–2008 demonstrated that the sector competitiveness is not in a critical situation. The sector competitiveness assessed by the RCA index and foreign trade is not going to be improved, however. The stagnation has come. As it follows from the SWOT analysis, the reason is an insufficient exploitation of some opportunities. In addition, there appear some risks.

Food producers are meeting the basic problems in the output sphere mainly in the domestic market. Above all, it is necessary to strengthen marketing with regard to improving the Czech products competitiveness.



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