Performance comparison of food processing and manufacturing companies in China

Reception of originals: 03/15/2020
Release for publication: 09/07/2020

Jian Xu
PhD in Accounting
Institution: School of Management, Qingdao Agricultural University
Address: No. 700 Changcheng Road, Chengyang District, 266109, Qingdao, China
E-mail: **xujiansword@163.com**

Jingsuo Li
Professor in School of Management
Institution: School of Management, Qingdao Agricultural University
Address: No. 700 Changcheng Road, Chengyang District, 266109, Qingdao, China
E-mail: **lijingsuo2001@163.com**
(Corresponding author)

Abstract

Food industry development is an important economic cornerstone in China. China's food industry growth rate has begun to decline and this industry is facing some challenges. It is unavoidable that China's food industry should transfer the development mode in the context of new normal. The purpose of this paper is to analyze and compare the performance of two types of food companies (i.e. food processing and food manufacturing) in China in the period 2016-2018. Corporate performance is measured from six distinct categories: corporate return, profitability ratios, liquidity ratios, solvency ratios, development ability, and innovation ability. The chi-square (χ^2) test is employed to test the statistical significance of differences in performance indicators. The results indicate that food manufacturing companies have better performance than food processing companies, and the performance of food processing companies shows a downward trend. Further analysis evidence that there are differences in corporate return and liquidity ratios between the two types of food companies.

Keywords. Performance comparison. Food processing companies. Food manufacturing companies

1. Introduction

China is the world's largest food production and consumption country. Food industry plays a vital role in China's economic development and produces basic necessity goods for consumers. In addition, food industry has strong links with other industries such as agriculture, chemicals, packaging and pharmaceuticals. The development of food industry has a short history in China. However, it is facing some challenges (e.g. environmental contamination,

consumer trust, and the rising cost of raw materials and labor) and must change its development mode under the new normal characterized by slower speed but higher quality. From the middle of 1980s, an annual growth rate of China's food industry maintained between 15% and 20%. Since 2011, this industry has no longer experienced the high-speed development (see Figure 1).

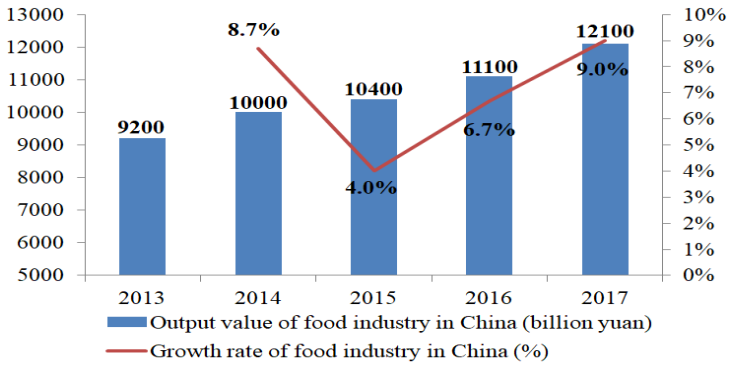

Figure 1: The development of food industry in China during 2013-2017
Source: China's National Bureau of Statistics

Food processing and manufacturing listed companies are the leaders in food industry (Chen and Tian, 2019). The Chinese government proposed an initiative called the new and old kinetic energy conversion, which is a major strategy to promote the transformation of economic growth modes (Xue *et al*., 2019). This has exposed food companies to significant structural adjustments. The success or failure of these food companies will likely decide the future of China's food industry. Most of food companies in China are small and medium-sized enterprises (SMEs) compared with advanced nations. The end market businesses, like the huge supermarket chains, often have a strong impact on the food processing industry. As a result, large processing companies are more likely to replace SMEs.

Food companies are considered to operate in a mature and relatively low technology area (Avermaete *et al*., 2004; Triguero *et al*., 2013; Hockmann *et al*., 2018). Food products are easy to imitate with significant research and development (R&D) spillovers, which reduces firms' incentive to invest in R&D (Gopinath and Vasavade, 1999). The increasing demand for more safety and healthy foods forces the food industry into innovative and value-conscious new products. Carew and Florkowski (2010) and Ghazalian (2012) argued that R&D investment is essential for industrial growth and competitive advantage in food processing and manufacturing industry.

The purpose of this paper is to analyze and compare the performance of Chinese food processing and manufacturing companies. To do so, this paper selects 32 food processing

companies and 33 food manufacturing companies for a three-year period (2016-2018). In addition, the chi-square ($\chi 2$) test is applied to test whether there is a statistically significant difference in the performance between food processing companies and food manufacturing companies.

The contributions of this paper are as follows. First, there are less studies covering the performance comparison of food processing and manufacturing sector in emerging economies such as China, and this paper attempts to fill this gap. Second, corporate performance is systematically and comprehensively measured from six distinct categories, that is, corporate return, profitability ratios, liquidity ratios, solvency ratios, development ability, and innovation ability. Finally, this will provide an insight for corporate managers to improve financial performance as well as outsider investors to make reasonable investment strategies.

The rest of the paper is structured as follows. Section 2 develops the research methodology. Section 3 reports the performance comparison of food processing and manufacturing companies in China, followed by the discussion in Section 4. Finally, Section 5 concludes the paper.

2. Research Methodology

2.1. Performance indicator selection

The methodology of corporate performance valuation is based on the analysis of performance indicators calculated from financial statements. Ager *et al.* (2012), Hall *et al.* (2013), Mijić *et al*. (2014), Jakšić *et al*. (2015), Vaško *et al*. (2018), Chen and Tian (2019) provide a basis for the research methodology. However, in the dynamic business environment, development ability determines whether a company can expand its scale and financial resources in the long run (Xu and Ni, 2004; Niu *et al*., 2018). Innovation ability is the engineer for companies to obtain competitiveness and improve profits (Carew and Florkowski, 2010; Ghazalian, 2012; Triguero *et al*., 2013; Hockmann *et al*., 2018; Vancauteren, 2018; Xu and Sim, 2018; Xu *et al*., 2019). These two categories are included to systematically and comprehensively assess a company's performance in this study. Therefore, the performance of food processing and manufacturing companies in China is assessed from six distinct categories: corporate return, profitability ratios, liquidity ratios, solvency ratios, development ability, and innovation ability.

The objective of the analysis of corporate return is to recognize a company's ability to generate profits by utilizing assets and equity (Bragg, 2002). Corporate return of food

processing and manufacturing companies is measured by four indicators: return on total assets (ROTA), return on assets (ROA), return on equity (ROE), and return on invested capital (ROIC).

In order to assess the profitability of food processing and manufacturing companies, gross profit margin (GPM) and net profit margin (NPM) are used. The two ratios aim to recognize the relation of profit to total sales of a company (Mijić *et al*., 2014).

Liquidity ratios measure a company's ability to convert its assets into cash. In this study, current ratio (CR), quick ratio (QR), and cash asset ratio (CAR) are applied.

Solvency ratios measure a company's ability to meet its financial obligations. The objective of this analysis is directed towards an assessment of the potential risk of borrowing and investment in the company. Debt to assets ratio (DAR) and long-term liability ratio (LLR) are employed.

Regarding development ability, total assets growth rate (TAGR) and sales growth rate (SGR) are used.

In terms of innovation ability, R&D intensity (RD) and innovation output (IO) are chosen.

Table 1 provides the overview of measurement and reference values of performance indicators used in this study.

Table 1: Performance indicators

Category	Indicator	Measurement	Reference value
Corporate return	Return on total assets (ROTA)	Earnings before interest and taxed/Total assets	> 0, higher preferred
	Return on assets (ROA)	Net income/Average total assets	> 0, higher preferred
	Return on equity (ROE)	Net income/Average shareholder equity	> 0, higher preferred
	Return on invested capital (ROIC)	(Net income + Interest expense)/Invested capital	> 0, higher preferred
Profitability ratios	Gross profit margin (GPM)	Gross income/Total income	> 0, higher preferred
	Net profit margin (NPM)	Net income/Total income	> 0, higher preferred
Liquidity ratios	Current ratio (CR)	Current assets/Current liabilities	> 2
	Quick ratio (QR)	(Current assets - Inventory)/Current liabilities	> 1
	Cash asset ratio (CAR)	Cash/Current liabilities	> 1
Solvency ratios	Debt to assets ratio (DAR)	Total liabilities/Total assets	< 0.5
	Long-term liability ratio (LLR)	Long-term liabilities/Total assets	< 0.2
	Total assets growth ratio	(Current year's total assets - Last year's	> 0

Development ability	(TAGR)	total assets) - 1	
	Sales growth rate (SGR)	(Current year's sales - Last year's sales) - 1	> 0
Innovation ability	R&D intensity (RD)	R&D expenditure/Total sales	> 0
	Innovation output (IO)	The number of patents applications	> 0

Source: Author's illustration

2.2. Research method

The research sample consists of 32 food processing companies and 33 food manufacturing companies listed on the Shanghai and Shenzhen stock exchanges for a three-year period (2016-2018). Companies with missing information, companies listed after 2016, and special treatment (ST) companies are excluded. All data are retrieved from the China Stock Market & Accounting Research (CSMAR) database and the Wind database.

Empirical research is carried out in two steps. First, we compare the performance of food processing companies and food manufacturing companies. The first step is based on the calculated ratios in each category. Second, the statistical significance of differences in food processing companies and food manufacturing companies is tested by the chi-square (χ^2) test (Black, 2012).

3. Results

3.1. Corporate return analysis

3.1.1. Comparison of food processing companies and food manufacturing companies

Table 2 shows that food companies in China have a healthy development, and food manufacturing companies have a better return than food processing companies. Generally, it can be noticed that corporate return of food processing companies shows a downward trend from 2016 to 2018, while it keeps stable in food manufacturing companies. Vaško *et al*. (2018) argued that food companies have positive ROA and ROE in the Republic of Srpska. Dakić et al. (2019) concluded that food processing companies in Serbia have a very low level of corporate return measured by ROA.

Table 2: Corporate return of food processing and manufacturing companies during 2016-2018

Indicator (Mean)	Food processing companies			Food manufacturing companies		
	2016	2017	2018	2016	2017	2018
ROTA	0.0913	0.0554	0.0508	0.0788	0.1023	0.0771
ROA	0.0524	0.0433	0.0367	0.0630	0.0639	0.0634
ROE	0.0829	0.0700	0.0709	0.0908	0.0867	0.0911

ROIC	0.0647	0.0550	0.0508	0.0791	0.0747	0.0727

Source: Author's calculation

3.1.2. Statistical significance of differences in food processing companies and food manufacturing companies

If a ratio does not meet the standard of reference value, it is considered to be unsatisfactory. Figure 2 reveals that most food processing and manufacturing companies had satisfactory corporate return. However, the number of companies in food processing and manufacturing sector with satisfactory returns dropped during this period.

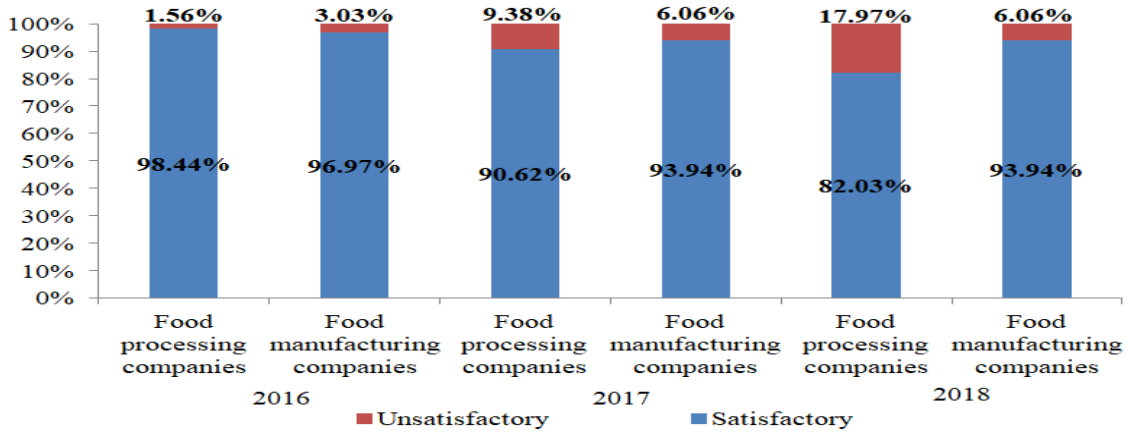

Figure 2: Distribution of corporate return of food processing and manufacturing companies during 2016-2018

Source: Author's illustration

The chi-square (χ^2) test is used to determine whether food processing companies have better corporate return compared to food manufacturing companies. From the results in Table 3, it is observed that there is a statistically significant difference in corporate return between food processing companies and food manufacturing companies only in 2018 ($\chi^2 = 8.775$, $p = 0.003 < 0.05$).

Table 3: Results of chi-square (χ^2) test on corporate return during 2016-2018

Year	Test	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
2016	Pearson Chi-Square	0.621	1	0.431		
	Continuity Correction	0.141	1	0.708		
	Likelihood Ratio	0.634	1	0.426		
	Fisher's Exact Test				0.684	0.357
	Linear-by-Linear Association	0.619	1	0.432		
	Pearson Chi-Square	1.005	1	0.316		

2017	Continuity Correction	0.593	1	0.441		
	Likelihood Ratio	1.011	1	0.315		
	Fisher's Exact Test				0.358	0.221
	Linear-by-Linear association	1.001	1	0.317		
2018	Pearson Chi-Square	8.775	1	0.003		
	Continuity Correction	7.678	1	0.006		
	Likelihood Ratio	9.088	1	0.003		
	Fisher's Exact Test				0.004	0.002
	Linear-by-Linear association	8.741	1	0.003		

Source: Author's calculation

3.2. Profitability ratios analysis

3.2.1. Comparison of food processing companies and food manufacturing companies

Table 4 shows that food manufacturing companies have better profitability than food processing companies. In food manufacturing sector, firm profitability is stable. In 2018, the NPM was negative for food processing companies (-0.0265) but positive for food manufacturing companies (0.0894). This may result from the rising cost of raw materials and labor in China.

Table 4: Profitability ratios of food processing and manufacturing companies during 2016-2018

Indicator (Mean)	Food processing companies			Food manufacturing companies		
	2016	2017	2018	2016	2017	2018
GPM	0.1840	0.1798	0.1921	0.3538	0.3550	0.3529
NPM	0.0818	0.0366	-0.0265	0.0954	0.0981	0.0894

Source: Author's calculation

3.2.2. Statistical significance of differences in food processing companies and food manufacturing companies

Figure 3 indicates that most food processing and manufacturing companies have satisfactory profitability in the observed period. In 2016, all food processing companies had satisfactory profitability, while 90.62% met the criteria in 2018. The number of profitable food manufacturing companies had a very slight decreasing tendency from 98.48% to 96.97%.

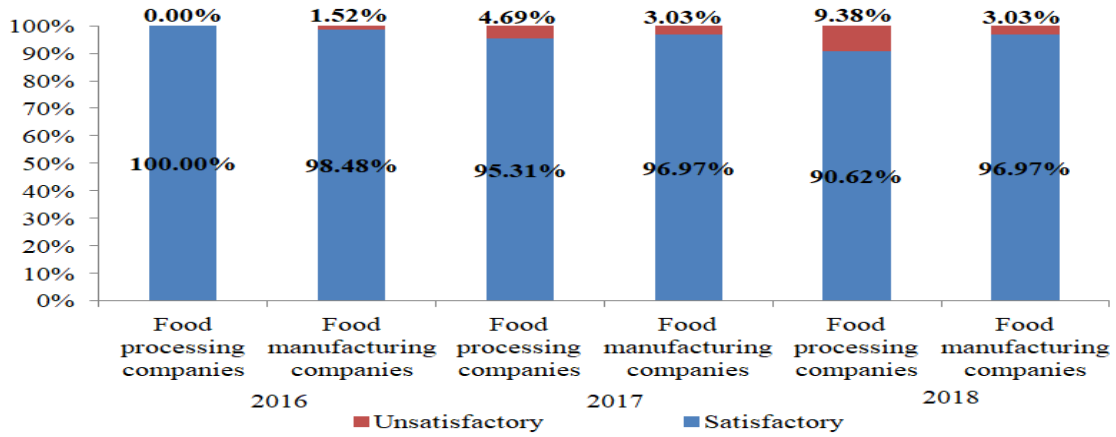

Figure 3: Distribution of profitability ratios of food processing and manufacturing companies during 2016-2018

Source: Author's illustration

Table 5 shows the results of chi-square (χ^2) test. During 2016-2018, all χ^2 values are not significant at the 5% level, which means that there is no significant difference in profitability ratios between the two types of food companies.

Table 5: Results of chi-square (χ^2) test on profitability ratios during 2016-2018

Year	Test	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
2016	Pearson Chi-Square	0.977	1	0.323		
	Continuity Correction	0.000	1	1.000		
	Likelihood Ratio	1.363	1	0.243		
	Fisher's Exact Test				1.000	0.508
	Linear-by-Linear Association	0.970	1	0.325		
2017	Pearson Chi-Square	0.241	1	0.623		
	Continuity Correction	0.001	1	0.972		
	Likelihood Ratio	0.243	1	0.622		
	Fisher's Exact Test				0.678	0.485
	Linear-by-Linear association	0.239	1	0.625		
2018	Pearson Chi-Square	2.265	1	0.132		
	Continuity Correction	1.299	1	0.254		
	Likelihood Ratio	2.357	1	0.125		
	Fisher's Exact Test				0.161	0.127
	Linear-by-Linear association	2.247	1	0.134		

Source: Author's calculation

3.3. Liquidity ratio analysis

3.3.1. Comparison of food processing companies and food manufacturing companies

Table 6 shows that liquidity ratios of food manufacturing companies are better than

those of food processing companies. This implies that food processing companies have low ability to convert their assets into cash, which is consistent with Vaško *et al*. (2018). In food processing sector, the CR and QR had a slight upward trend, while the CAR dropped from 0.65 to 0.47.

Table 6: Liquidity ratios of food processing and manufacturing companies during 2016-2018

Indicator (Mean)	Food processing companies			Food manufacturing companies		
	2016	2017	2018	2016	2017	2018
CR	1.88	1.99	2.04	3.30	3.97	4.00
QR	1.20	1.25	1.43	2.68	3.21	3.08
CAR	0.65	0.66	0.47	1.42	1.11	0.88

Source: Author's calculation

3.3.2. Statistical significance of differences in food processing companies and food manufacturing companies

Over the three-year period, liquidity ratios in China's food processing and manufacturing industry oscillated greatly (see Figure 4). In 2011, the proportion of food processing companies with satisfactory ratios increased from 27.08% to 45.83%, and then sharply decreased to 17.71% in 2018. The participation of food manufacturing companies with satisfactory ratios decreased from 47.47% in 2016 to 39.39% in 2018.

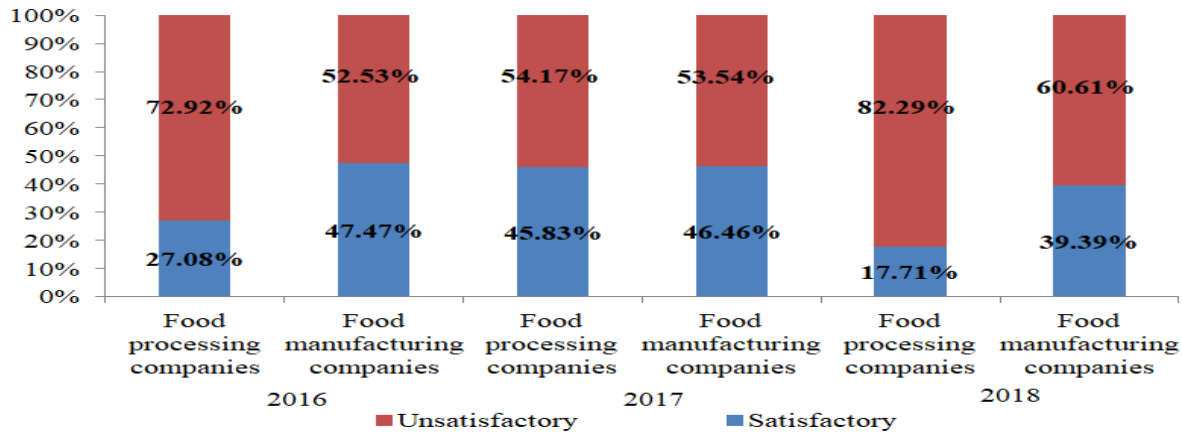

Figure 4: Distribution of liquidity ratios of food processing and manufacturing companies during 2016-2018
Source: Author's illustration

According to the χ^2 values in 2016 and 2018 in Table 7 ($\chi^2 = 8.653$, $p < 0.003$ and $\chi^2 = 10.041$, $p < 0.002$), there are significant differences in liquidity ratios between the two types of companies in 2016 and 2018.

Table 7: Results of chi-square (χ^2) test on liquidity ratios during 2016-2018

Year	Test	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
2016	Pearson Chi-Square	8.653	1	0.003		
	Continuity Correction	7.804	1	0.005		
	Likelihood Ratio	8.747	1	0.003		
	Fisher's Exact Test				0.005	0.003
	Linear-by-Linear Association	8.608	1	0.003		
2017	Pearson Chi-Square	0.008	1	0.930		
	Continuity Correction	0.000	1	1.000		
	Likelihood Ratio	0.008	1	0.930		
	Fisher's Exact Test				1.000	0.522
	Linear-by-Linear association	0.008	1	0.930		
2018	Pearson Chi-Square	10.041	1	0.002		
	Continuity Correction	9.068	1	0.003		
	Likelihood Ratio	10.230	1	0.001		
	Fisher's Exact Test				0.002	0.001
	Linear-by-Linear association	9.989	1	0.002		

Source: Author's calculation

3.4. Solvency ratio analysis

3.4.1. Comparison of food processing companies and food manufacturing companies

In Table 8, solvency ratio analysis of food processing and manufacturing companies suggests a low level of external financing. In 2018, the DAR increased in the two types of food companies. LLR as the second solvency ratio gives an insight into the fundamental financial health of a company. A company with a high long-term liability ratio is more at risk in the event of a business downturn. Table 8 shows that these companies can manage their long-term liabilities well. The findings of Liu (2018) showed that food processing companies in China largely depend on short-term loans and commercial credit to finance. However, Vaško *et al*. (2018) found that food companies have unfavorable capital structure because more than 50% of total assets are financed by debt.

Table 8: Solvency ratios of food processing and manufacturing companies during 2016-2018

Indicator (Mean)	Food processing companies			Food manufacturing companies		
	2016	2017	2018	2016	2017	2018
DAR	0.3451	0.3767	0.4236	0.3206	0.3323	0.3505
LLR	0.0706	0.0739	0.0780	0.0754	0.0632	0.0743

Source: Author's calculation

3.4.2. Statistical significance of differences in food processing companies and food manufacturing companies

In Figure 5, the participation of over-indebted companies in food processing sector increased from 7.81% in 2016 to 14.06% in 2018, while this participation in food manufacturing sector increased from 7.58% to 13.64% during the whole period.

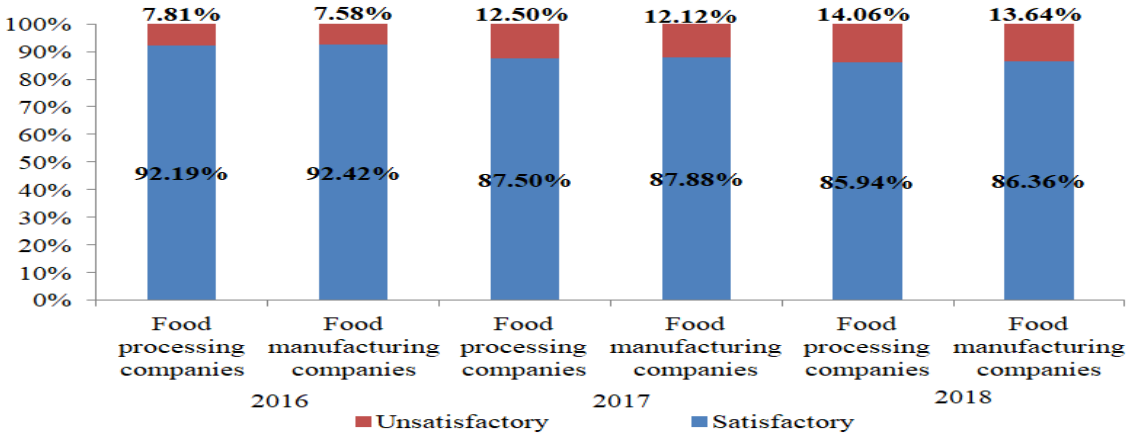

Figure 5: Distribution of solvency ratios of food processing and manufacturing companies during 2016-2018
Source: Author's illustration

The results of chi-square (χ^2) test are shown in Table 9. Because all χ^2 values are not significant at the 5% level, there is no significant difference in solvency ratios between food processing companies and food manufacturing companies.

Table 9: Results of chi-square (χ^2) test on solvency ratios during 2016-2018

Year	Test	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
2016	Pearson Chi-Square	0.003	1	0.960		
	Continuity Correction	0.000	1	1.000		
	Likelihood Ratio	0.003	1	0.960		
	Fisher's Exact Test				1.000	0.608
	Linear-by-Linear Association	0.003	1	0.960		
2017	Pearson Chi-Square	0.004	1	0.948		
	Continuity Correction	0.000	1	1.000		
	Likelihood Ratio	0.004	1	0.948		
	Fisher's Exact Test				1.000	0.579
	Linear-by-Linear association	0.004	1	0.948		
	Pearson Chi-Square	0.005	1	0.944		

2018	Continuity Correction	0.000	1	1.000		
	Likelihood Ratio	0.005	1	0.944		
	Fisher's Exact Test				1.000	0.572
	Linear-by-Linear association	0.005	1	0.944		

Source: Author's calculation

3.5. Development ability analysis

3.5.1. Comparison of food processing companies and food manufacturing companies

In Table 10, companies in food processing industry have a higher asset growth rate than food manufacturing companies. The SGR of food processing companies increased greatly from 9.27% to 286.71%, and then decreased to 19.01%. For food manufacturing companies, this ratio fluctuated around 14%. Guo and Zheng (2019) also found that Chinese food manufacturing listed companies have greater potential for development.

Table 10: Development ability of food processing and manufacturing companies during 2016-2018

Indicator (Mean)	Food processing companies			Food manufacturing companies		
	2016	2017	2018	2016	2017	2018
TAGR	0.2454	0.2613	0.1524	0.0786	0.1263	0.1130
SGR	0.0927	2.8671	0.1901	0.1400	0.1569	0.1420

Source: Author's calculation

3.5.2. Statistical significance of differences in food processing companies and food manufacturing companies

In Figure 6, the number of food processing companies with better development had a rise from 73.44% in 2016 to 79.69% in 2017, and then decreased to 78.12% in 2018. At the same time, the number of food manufacturing companies had the same change.

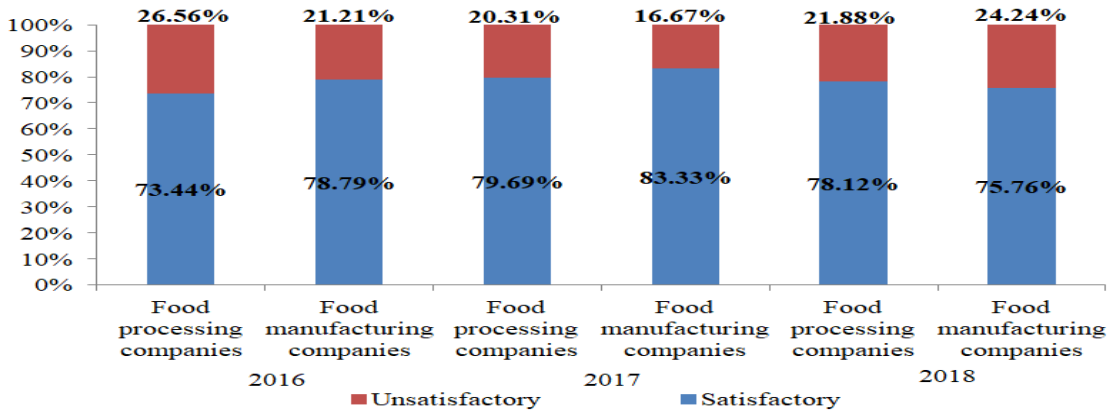

Figure 6: Distribution of development ability of food processing and manufacturing companies during 2016-2018
Source: Author's illustration

In Table 11, all χ^2 values are not significant at the 5% level, indicating there is no significant difference in development ability between food processing companies and food manufacturing companies.

Table 11: Results of chi-square (χ^2) test on development ability during 2016-2018

Year	Test	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
2016	Pearson Chi-Square	0.512	1	0.474		
	Continuity Correction	0.260	1	0.610		
	Likelihood Ratio	0.513	1	0.474		
	Fisher's Exact Test				0.540	0.305
	Linear-by-Linear Association	0.508	1	0.476		
2017	Pearson Chi-Square	0.287	1	0.592		
	Continuity Correction	0.096	1	0.757		
	Likelihood Ratio	0.287	1	0.592		
	Fisher's Exact Test				0.655	0.378
	Linear-by-Linear association	0.285	1	0.594		
2018	Pearson Chi-Square	0.103	1	0.749		
	Continuity Correction	0.013	1	0.911		
	Likelihood Ratio	0.103	1	0.749		
	Fisher's Exact Test				0.836	0.456
	Linear-by-Linear association	0.102	1	0.750		

Source: Author's calculation

3.6. Innovation ability analysis

3.6.1. Comparison of food processing companies and food manufacturing companies

Table 12 shows that R&D intensity of food companies is still at low level, consistent with the findings of Hockmann *et al*. (2018). The number of patents applied decreased from 2018. These suggest that food companies should strength their innovation abilities in order to achieve competitive advantage. Avermaete *et al*. (2004) found that R&D-based innovation improves the profitability of small food manufacturing firms. Vancauteren (2018) concluded that workers' skills exert a positive effect on patent counts for Dutch food firms.

Table 12: Innovation ability of food processing and manufacturing companies during 2016-2018

Indicator (Mean)	Food processing companies			Food manufacturing companies		
	2016	2017	2018	2016	2017	2018

RD	0.0154	0.0125	0.0124	0.0002	0.0189	0.0176
IO	33.22	34.13	19.66	22.18	22.09	6.76

Source: Author's calculation

3.6.2. Statistical significance of differences in food processing companies and food manufacturing companies

In the period 2016-2018, the number of innovative companies in the food industry had a slight fall. In 2018, 79.69% of food processing companies met the criteria of innovation ability, while the participation of food manufacturing companies with innovation ability was 84.85%. (see Figure 7)

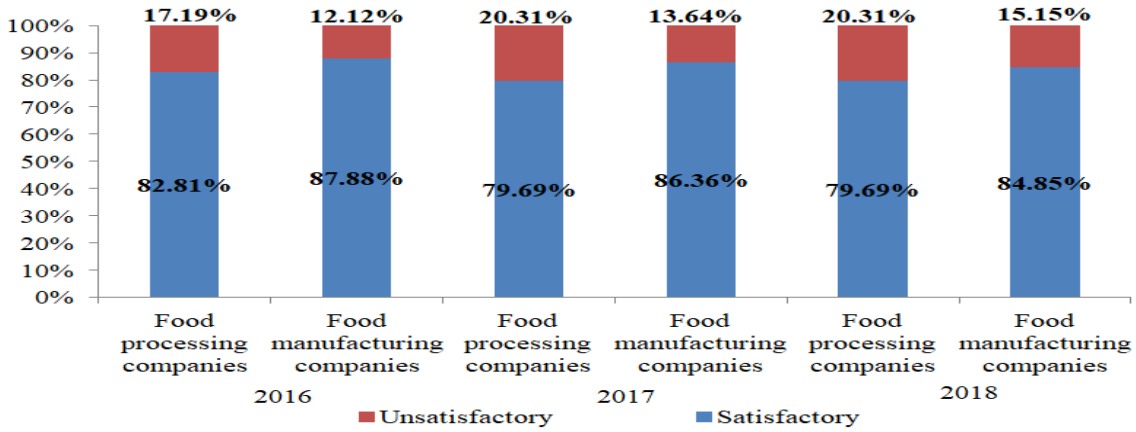

Figure 7: Distribution of innovation ability of food processing and manufacturing companies during 2016-2018

Source: Author's illustration

In Table 13, all χ^2 values are not significant at the 5% level, indicating there is no significant difference in innovation ability between food processing companies and food manufacturing companies.

Table 13: Results of chi-square (χ^2)test on innovation ability during 2016-2018

Year	Test	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
2016	Pearson Chi-Square	0.668	1	0.414		
	Continuity Correction	0.324	1	0.569		
	Likelihood Ratio	0.670	1	0.413		
	Fisher's Exact Test				0.464	0.285
	Linear-by-Linear Association	0.663	1	0.415		
2017	Pearson Chi-Square	1.030	1	0.310		
	Continuity Correction	0.610	1	0.435		
	Likelihood Ratio	1.034	1	0.309		
	Fisher's Exact Test				0.355	0.218
	Linear-by-Linear	1.022	1	0.312		

	association					
2018	Pearson Chi-Square	0.594	1	0.441		
	Continuity Correction	0.293	1	0.588		
	Likelihood Ratio	0.595	1	0.440		
	Fisher's Exact Test				0.496	0.294
	Linear-by-Linear association	0.590	1	0.443		

Source: Author's calculation

4. Discussion

The research results suggest that food manufacturing companies have better performance than food processing companies in the period 2016-2018. The performance of food processing companies has a downward trend, while food manufacturing companies have a very good and stable performance.

Table 14 shows the statistical significance of the differences in performance indicators. Regarding six categories, the statistical significance of differences is evidenced for liquidity ratios in two years and corporate return in one year. When years are compared, it is noticed that corporate return and liquidity ratios are significant different in 2018. In the process of China's economic transformation, food manufacturing companies are more likely to effectively and efficiently utilize their resources through technological upgrade and industrial structure transformation. However, their performance may be challenged in the next period, time span should be prolonged in future studies.

Table 14: Summary of statistical significance of differences in performance indicators during 2016-2018

Category	2016	2017	2018
Corporate return	No	No	Yes
Profitability ratios	No	No	No
Liquidity ratios	Yes	No	Yes
Solvency ratios	No	No	No
Development ability	No	No	No
Innovation ability	No	No	No

Source: Author's illustration

5. Conclusion

This study analyzes and compares the performance of food processing and manufacturing companies in China. Comparative analysis shows that food manufacturing companies have better results than food processing companies in terms of performance indicators during 2016-2018. In addition, there are statistically significant differences in the

corporate return and liquidity ratios.

The findings of this paper may have several practice implications. Firstly, Chinese food companies should adjust their capital structure and improve the effectiveness of asset utilization. At the same time, these companies have to improve the quality of their products and simultaneously focus on the cost factor (Psomas *et al*., 2018). In addition, food processing companies should expand their operation scale by merging some SMEs to be competitive to foreign corporations. In food processing industry, corporate managers need to make reasonable innovation strategies and focus more on product innovation, process innovation, market innovation, and organizational innovation (Ghazalian and Fakih, 2016). Finally, outsider investors should accurately assess corporate performance through various performance indicators when investing in food industry.

6. References

AGER, K.; SAER, I.M.; DEMAN, N. Financial ratio as an evaluation instrument of business activity in small and medium-sized enterprises. *International Journal of Management Cases*. v. 14, n. 4, p. 373-385, 2012.

AVERMAETE, T.; VIAENE, J.; MORGAN, E.J.; PITTS, E.; CRAWFORD, N.; MAHON, D. Determinants of product and process innovation in small and food manufacturing firms. *Trends in Food Science & Technology*, v. 15, n. 10, p. 474-483, 2004.

BLACK, K. *Business Statistics: For Contemporary Decision Making*. John Wiley & Sons, Hoboken, 2012.

BRAGG, S.M. *Business Ratios and Formulas: A Comprehensive Guide*. John Wiley & Sons, New Jersey, 2002.

CAREW, R.; FLORKOWSKI, W.J. Productivity and business R&D:A study of Canadian food manufacturing industries, 1994-2005. *British Food Journal*, v. 112, n. 6-7, p. 737-750, 2010.

GHAZALIAN, P.L. Assessing the effects of international trade on private R&D expenditures in the food processing sector. *Industry and Innovation*, v. 19, n. 4, 349-369, 2012.

GHAZALIAN, P.L.; FAKIH, A. R&D and innovation in food processing firms in transition countries. *Journal of Agricultural Economics*, v. 68, n. 2, p. 427-450, 2016

CHEN, L.; TIAN, Y.R. Financial performance evaluation of food manufacturing listed companies based on partial order set theory. *Journal of Liaoning Technical University (Social Science Edition)*, v. 21, n. 2, p. 134-142, 2019.

DAKIĆ, S.; MIJIĆ, K.; JAKŠIĆ, D. Multiple regression approach to modelling determinants of business success based on financial statements: Evidence from food processing companies in the Republic of Serbia. *Custos e Agronegocio On Line*, v. 15, n. 4, p. 485-501, 2019.

GOPINATH, M.; VASAVADA, U. Patents, R&D, and market structure in the U.S. food processing industry. *Journal of Agricultural and Resource Economics*, v. 24, n. 1, p. 127-139, 1999.

GUO, C.J.; ZHENG, B.Y. An empirical study on the determinants of capital structure in the Chinese food manufacturing listed companies. *Journal of Chongqing University of Arts and Science (Social Sciences Edition)*, v. 38, n. 1, p. 27-35, 2019.

HALL, R.J.; BECK, F.; DE TOLEDO, J.R. Analysis of impact of the subprime crisis in the Brazilian agribusiness firms listed on BM&FBovespa. *Custos e Agronegocio On Line*, v. 9, n. 1, p. 52-77, 2013.

HOCKMANN, H.; DELVAUX, P.A.G.; VOIGT, P.; CIAIAN, P.; PALOMA, S.G.Y. Corporate R&D and the performance of food-processing firms: Evidence from Europe, Japan and North America. *Bio-based and Applied Economics*, v. 7, n. 3, p. 233-247, 2018.

JAKŠIĆ, D.; MIJIĆ, K.; ZEKIĆ, S.; POLJAŠEVIĆ, J. Comparative profitability analysis of milk production companies to milk processing companies in Serbia. *Custos e Agronegocio On Line*, v. 11, n. 3, p. 206-226, 2015.

Liu, X.Y. The research on the influencing factors of capital structure of Chinese food processing industry listed companies. *The Food Industry*, v. 39, n. 8, p. 184-187, 2018.

MIJIĆ, K.; ZEKIĆ, S.; JAKŠIĆ, D.; VUKOVIĆ, B. Meat industry in Serbia: performance analysis of meat-processing and livestock companies. *Custos e Agronegocio On Line*, v. 10, n. 3, p. 124-144, 2014.

NIU, X.R.; ZHANG, M.; LI, X.R. Analysis of development capacities of listed companies in forestry industry. *Journal of Sichuan Forestry Science and Technology*, v. 39, n. 6, p. 92-96, 2018.

PSOMAS, E.; DIMITRANTZOU, C.; VOUZAS, F.; BOURANTA, N. Cost of quality measurement in food manufacturing companies: the Greek case. *International Journal of Productivity and Performance Management*, v. 67, n. 9, p. 1882-1900, 2018.

TRIGUERO, A.; CÓRCOLES, D.; CUERVA, M.C. Difference in innovation between food and manufacturing firms: An analysis of persistence. *Agribusiness*, v. 29, n. 3, p. 273-292, 2013.

VANCAUTEREN, M. The effects of human capital, R&D and firm's innovation on patents: a panel study on Dutch food firms. *Journal of Technology Transfer*, v. 43, n. 4, p. 901-922, 2018.

VAŠKO, Ž.; OSTOJIĆ, A.; DRINIĆ, L. Financial performance analysis of the companies in the agricultural sector and food industry in the Republic of Srpska. *Agro-knowledge Journal*, v. 19, n. 2, p. 67-78, 2018.

XU, J.; LIU, F.; CHEN, Y.H. R&D, advertising and firms' financial performance in South Korea: Does firm size matter? *Sustainability*, v. 11, n. 14, p. 3764, 2019.

XU, J.; SIM, J.W. Characteristics of corporate R&D investment in emerging markets: Evidence from manufacturing industry in China and South Korea. *Sustainability*, v. 10, n. 9, p. 3002, 2018.

XU, X.G.; NI, F. Developing ability of the listed agricultural companies. *Journal of Nanjing Agricultural University (Social Science Edition)*, v. 4, n. 3, p. 38-43, 2004.

XUE, W.L.; LI, B.K.; YANG, Y.Q.; ZHAO, H.R.; XU, N. Evaluating the effectiveness of new and old kinetic energy conversion from an electric power economics perspective: Evidence on the Shandong Province of China. *Energies*, v. 12, n. 6, p.1174, 2019.

7. Acknowledgements

This research was financially supported by the Key Research and Development Program of Shandong Province (Grant Number 2019FW037) and the Social Science Planning Fund Program of Shandong Province (Grant Number 20CGLJ05).