

## A Study of Financial Performance using DuPont Analysis in Food Distribution Market

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**ABSTRACT:** This study attempts to measure the financial performance of the food distribution company. In order to achieve the goal, this study have measured the ratios of ROE, ROA applying the DuPont analysis, which have been demonstrated with tables to show the change periodically. DuPont analysis is based on analysis of Return on Equity (ROE) & Return on Investment (ROI). The return on equity disaggregate performance into three components: Net Profit Margin, Total Asset Turnover, and the Equity Multiplier. The return on investment consists of Assets Turnover (Operating Income×Total Assets) and Profit Margin (EBIT×Operating Income). From the study it if found that Hyundai Green Food's Financial performance is high followed by Foodmerce and then Dongwon home food and Lotte Food. The four companies are significant at their level. In conclusion, ROE & ROI is the most comprehensive measure of profitability of a firm. It considers the operating and investing decisions can be made as well as the financing and their leverage-related decisions.

**Keywords:** DuPont analysis, return on equity, return on investment, financial performance, food distribution firms

### INTRODUCTION

The economic development of Korea over the past 50 years has been among the most rapid and sustained. It has transformed from one of the poorest countries to becoming a leading industrial nation and the world's 8<sup>th</sup> largest exporter. Korea relies largely on imports of agricultural goods and food product as only 30 % of its land is arable and the rest is mountainous. Much of the limited farmland has been dedicated to rice production. Over 50% of Korea's population of 49.8 million lives in the Seoul metropolitan area and its suburban areas[1]. With the increasing household incomes and consumer's diversified tastes of food products, this has helped expand the import market of food and agricultural products[2,3].

There are multiple levels of importers and distri-

butors especially for imported food distribution in Korea. Typically these importers and distributors play key role to develop new product market in Korea. They supply imported food products to the wholesalers and retailers, or some of them sell via their own retail chains. Generally the most imported consumer ready products enter the country via the port of Busan, the 2<sup>nd</sup> largest city in Korea. Port of Incheon, which is much closer to Seoul's metropolitan market, is another important entry port. The capital city, Seoul and its surrounding region have over 50% of Korean population and 70% of retail sales in Korea. Accordingly, Seoul metropolitan area obtains larger and significant shares of food market sales. Other markets that have strong growth include Busan, Incheon and Daejeon[4]. Major local food processors, hypermarkets, department stores, convenient stores and leading food service companies,

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and those who have advanced chain management system operate their own 'distribution centers' in Korea, and all food products are collected and centered at this distribution center and then delivered to each retail via their own distribution[5].

DuPont analysis is a method of performance measurement that was started by the DuPont Corporation in the 1920s[6-8]. With this method, assets are measured at their gross book value rather than at net book value to produce a higher return on equity (ROE). It is also known as DuPont identity. The elegance of ROA being affected by a profitability measure and an efficiency measure led to the DuPont method becoming a widely-used tool of financial analysis Liesz[8]. In the 1970's, emphasis in financial analysis shifted from ROA to return on equity (ROE), and the DuPont model was modified to include the ratio of total assets to equity. Three distinct versions of DuPont have been created and used to help unravel the underlying drivers of profitability and return over time, beginning nearly 90 years ago. The DuPont Model is a useful tool in providing both an overview and a focus for such analysis. It can be used as a compass in the process by directing the analyst toward significant areas of strength and weakness evident in the financial statements[9]. This study attempts basically to measure the financial performance of the food distribution market in Republic of Korea. The main objective is to find out the ratios of ROE and ROI for top seven food distribution industries for a period 3 years from 2013~2015. The aim of the study is to see financial performance of local food distribution firms based on DuPont analysis which includes ROE and ROI[9].

## LITERATURE REVIEW

### *Financial Performance*

Financial ratios express relationships between financial statement items. Although they provide historical data, management can use ratios to identify internal strengths and weaknesses, and estimate future financial performance. Investors can use ratios to compare companies in the same industry. Ratios are not generally meaningful as standalone numbers, but they are meaningful when compared to historical data and industry averages. Financial Per-

formance Ratios is used to depict the performance of a business. These ratios are derived from the items of a financial statement[10]. To derive a financial ratio, one variable of the financial statement is divided by the other. It illustrates the relationship between two financial variables. A financial ratio is an important tool for small business firms and managers to measure the progress for achieving the targeted goals. Financial Analysis is the summarizing of large quantities of financial data for the purpose of evaluation and comparison of performance of a company over time, it's more or less the process of reducing a large amount of historical financial data, taken from financial accounting statements, to a smaller set of information more useful for decision making Archer. This analysis is usually done through the use of accounting ratios otherwise known as Financial Ratio[11].

### *Concept of DuPont Model*

For any business in the private sector there are numerous of models to describe how well the business is running. Among these the DuPont model was created in the early 1900s but is still a model valid to use for assessment of the profitability. Remarkably it has not been used in the security community for risk prioritization or impact analysis. The product of two often-computed ratios, net profit margin and total asset turnover, equals return on assets (ROA). The elegance of ROA being affected by a profitability measure and an efficiency measure led to the DuPont method becoming a widely-used tool of financial analysis[8]. In the 1970's, emphasis in financial analysis shifted from ROA to return on equity (ROE), and the DuPont model was modified to include the ratio of total assets to equity[12]. Choi et al (2007) concludes that returns derived from capital are more persistent because of the larger frictions to the movement of capital through an economy[13]. The focus of this study, however, explores the use of the information in these components by those who have a vested interest in the prediction of future earnings. Numerous studies have explored how market participants, either stock investors or analysts, incorporate the information in earnings into their decisions.

DuPont analysis, a common form of financial sta-

tement analysis, decomposes return on net operating assets into two multiplicative components: profit margin and asset turnover[8,13]. These two accounting ratios measure different constructs and, accordingly, have different properties. Prior research has found that a change in asset turnover is positively related to future changes in earnings. DuPont analysis takes into account three indicators to measure firm profitability.

#### *Return on Assets(ROA)*

ROA offers a different take on management effectiveness and reveals how much profit a company earns for every dollar of its assets[6,7]. Assets include things like cash in the bank, accounts receivable, property, equipment, inventory and furniture. Only a few professional money managers will consider stocks with a ROA of less than 5%.

$$ROA = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Total asset}} = \frac{\text{Net income}}{\text{Total assets}}$$

\* Net income=net income after taxes

#### *Return on Equity(ROE)*

It is a basic test of how effectively a company's management uses investors' money. ROE shows whether management is growing the company's value at an acceptable rate. Also, it measures the rate of return that the firm earns on stockholder's equity. Because only the stockholder's equity appears in the denominator, the ratio is influenced directly by the amount of debt a firm is using to finance assets [13,14]. ROE ratio is a measure of the rate of return to stockholders. Decomposing the ROE into various factors influencing company performance is often called the DuPont system[12]:

$$ROE = \frac{\text{Net income}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \frac{\text{Net income}}{\text{Equity}}$$

\* ROE=(Net Profit Margin)

×(Total Asset Turnover)×(Equity Multiplier)

ROE is calculated by taking the profit after tax and preference dividends of a given year and dividing it by the book value of equity (ordinary shares) at the beginning of the year. Average equity can also be used. Equity would consist of issued ordinary

share capital plus the share premium and reserves [14]. ROE can also be stated as:

$$ROE = \frac{\text{Net income}}{\text{Pretax income}} \times \frac{\text{Pretax income}}{\text{EBIT}} \\ \times \frac{\text{EBIT}}{\text{Sales}} \times \frac{\text{Sales}}{\text{Assets}} \times \frac{\text{Assets}}{\text{Equity}} = \frac{\text{Net income}}{\text{Equity}}$$

\* EBIT=Earnings before interest and taxes

## **METHOD**

The aim of this paper is to conduct the comparative financial performance analysis of selected food distribution firms. The paper also finds out the competition in the food distribution sector and the use of the ratio to measure the performance. The paper emphasizes on the comparative ratio analysis on 7 different food distribution firms which are selected followed by below conditions.

- 1) Subjects of external audit firm on December 31st 2015.
- 2) Food distribution companies that operate in base business.
- 3) There is no error value on a financial information disclosed

The selected firms are Shinsegae Food, CJ Freshway, Hyundai Green Food, Daesang Bestco, Foodmerce, Lotte Food, Dongwon Home Food. Our comparative study periods cover the three years from 2013 to 2015. All the analyzed data collected from the Data Analysis, Retrieval and Transfer System in financial supervisory service in Republic of Korea [16,17]. The output is presented through table and graph using Microsoft Excel 2016 and SPSS 21.0. The paper analyzed the comparative performance of the bank using different ratios under Profitability Ratio, Liquidity Ratio, Risk Measurement Ratio and DuPont Analysis.

## **RESULTS**

### *Financial Ratios*

Table 1 showed financial ratios of food distribution companies. Liquidity ratios measure a firm's ability to meet its current obligation showing 155.63,

143.28 and 135.36. They are used to measure the financial soundness of a business and how well the company can satisfy its short and long obligations. They are also called solvency ratios. Solvency ratios measure the dependence of a firm on borrowed funds. Liquidity is a firm's ability to meet short-term obligations or generate cash quickly at a reasonable cost. It reflects the short-term financial strength of a firm. Local food distribution firms showed decreased liquidity ratios. The limited portion of the deposit received through the depositor can be easily converted into cash. Liquidity helps to reduce the liquidity risk, which directly leads to bankruptcy. The ratio is calculated by dividing current assets by current liabilities, which test the short-term solvency of the firms.

Leverage Ratios is what degree does an enterprise utilize borrowed money and what is its level of risk. Lenders often use this information to determine a

business's ability to repay debt. Debt to equity compares capital invested by owners/funders (including grants) and funds provided by lenders. The firms showed increasing value of leverage ratios (56.00, 62.14 and 67.60) showing lenders have priority over equity investors on an enterprise's assets. The more equity there is, the more likely a lender will be repaid. Most lenders impose limits on the debt/equity ratio, commonly 2:1 for general business loans. The equity multiplier is calculated by dividing a company's total asset value by total net equity, and it measures financial leverage. Companies finance their operations with equity or debt, so a high equity multiplier indicates that a larger portion of asset financing is attributed to debt. The equity multiplier is a variation of the debt ratio, and its definition of debt financing includes all liabilities.

Activity ratios included inventory turnover(14.40, 12.99, and 13.02), receivable turnover(, total asset

Table 1. Analysis of financial ratios in food distribution companies

Category	Sub-category	Period(year)		
		2013	2014	2015
Liquidity ratio	Current ratio*	155.63	143.28	135.36
	Quick ratio	124.28	109.59	102.93
Leverage ratio	Debt to equity ratio	56.00	62.14	67.60
	Equity multiplier	1.58	1.65	1.73
Activity ratio	Inventory turnover ratio	14.40	12.99	13.02
	Receivable turnover ratio	9.77	12.05	12.98
	Total asset turnover ratio	1.50	1.72	1.75
Profitability ratio	ROA	4.04	4.57	3.77
	ROE	7.82	8.56	7.20
	PM	3.29	3.02	2.37

\* Current ratio=Current assets/Current liabilities

Quick ratio=(Current assets-Inventory)/Current liabilities

Debt to equity ratio=Total debt/Total shareholders' equity

Equity multiplier=Total assets/Shareholders' equity

Inventory turnover ratio=Cost of goods sold/Inventory

Receivable turnover ratio=Sales on credit/Account receivable

Total asset turnover ratio=Sales/Total assets

ROA=Net income/Total assets

ROE=Net income/Shareholders' equity

PM=Net income/Sales

turn over. Inventory Turnover is the number of times you turn inventory over into sales during the year or how many days it takes to sell inventory. This is a good indication of production and purchasing efficiency. A high ratio indicates inventory is selling quickly and that little unused inventory is being stored. If the ratio is low, it suggests overstocking, obsolete inventory or selling issues. Total Asset Turnover is the number of times trade receivables turnover during the year. The higher the turnover, the shorter the time between sales and collecting cash. How efficiently your business generates sales on each dollar of assets. An increasing ratio indicates you are using assets more productively.

ROA measures firm's ability to turn assets into profit showing 4.04, 4.57, and 3.77 respectively. This is a very useful measure of comparison within an industry. A low ratio compared to industry may mean that your competitors have found a way to operate more efficiently. After tax interest expense can be added back to numerator since ROA measures profitability on all assets whether or not they are financed by equity or debt. ROE is rate of return on investment by shareholders showing 7.82, 8.56, and 7.20 respectively. This is one of the most important ratios to investors. PM(3.29, 3.02, and 2.37) is showing how much money are firm making per every \$ of sales. This ratio measures firm's ability to cover all operating costs including indirect costs.

#### *Operating Margin Ratio*

Operating margin ratio or return on sales ratio is

the ratio of operating income of a business to its revenue. It is profitability ratio showing operating income as a percentage of revenue. Operating income is same as earnings before interest and tax (EBIT). Both operating income and revenue figures can be obtained from the income statement of a business. Except Daesang Bestco, all firms show positive ratio meaning most companies is profitable firm in its industry (Table 2).

#### *DuPont Identity Compositions*

The DuPont analysis computes variables from the income statement and balance sheet to determine a firm's return on equity (ROE) & return on Investment (ROI). From 2013 to 2015, ROE in food distribution market has been increased and decreased again. Profit margin has been decreased. it seems to be affected by the continuous economic downturn. Small increase in TAT shows that efficiency of assets is getting better. Because the companies increased its debt increased, EM increased slightly (Table 3).

Table 4 shows that each firms profitability origin during 3 years. Among 7 firms, Foodmerce showed highest profitable index. Foodmerce is kind of food manufacturing and processing company including diverse solid brands. Foodmerce is very efficient company showing ROE(50.60%), PM(3.53%), and TAT(4.31%). At the same time, they also showed useful leverage effect.

#### *Correlations among Financial Variables*

Table 2. Operating margin ratio in food distribution companies

Food distribution company	Period(Industry Average)		
	2013(3.29)	2014(3.02)	2015(2.37)
Shinsegae food	3.14	1.25	0.96
CJ freshway	0.45	1.52	1.52
Hyundae green food	3.87	3.98	4.16
Daesang bestco	Δ2.60	Δ4.36	Δ7.77
Foodmerce	4.32	4.75	4.70
Lotte food	4.70	4.04	4.06
Dongwon home food	11.59	4.88	4.08

Table 3. Trends analysis of DuPont identity compositions

Period	ROA	ROE	PM	TAT	EM
2015	4.15	7.18	2.37	1.75	1.73
2014	5.19	8.57	3.02	1.72	1.65
2013	4.95	7.80	3.29	1.50	1.58
2013~2015 average	4.76	7.85	2.89	1.66	1.65

Table 4. Profitability origin of food distribution company during 3 years

Company	Period	ROA	ROE	PM	TAT	EM
Shinsegae food	2015	1.33	9.41	0.74	1.80	7.08
	2014	1.10	2.23	0.64	1.71	2.03
	2013	6.73	12.75	2.68	2.52	1.89
CJ freshway	2015	0.88	3.24	0.32	2.73	3.69
	2014	1.39	4.78	0.52	2.67	3.45
	2013	△2.34	△7.64	△0.75	3.14	3.26
Hyundai green food	2015	4.68	6.23	4.33	1.08	1.33
	2014	5.20	7.09	4.98	1.04	1.36
	2013	4.76	6.43	5.19	0.92	1.35
Daesang bestco	2015	△14.06	△99.15	△8.50	1.65	7.05
	2014	△7.84	△32.77	△4.05	1.94	4.18
	2013	△5.83	△14.56	△2.58	2.26	2.50
Foodmerce	2015	<b>15.22</b>	<b>50.60</b>	<b>3.53</b>	<b>4.31</b>	<b>3.32</b>
	2014	15.47	53.27	3.41	4.54	3.44
	2013	10.97	32.28	2.43	4.51	2.94
Lotte food	2015	3.90	5.63	2.95	1.33	1.44
	2014	5.02	7.20	3.67	1.37	1.43
	2013	10.10	14.75	7.27	1.39	1.46
Dongwon home food	2015	7.42	12.68	3.02	2.46	1.71
	2014	9.84	22.12	3.67	2.68	2.25
	2013	11.62	19.90	8.64	1.34	1.71

Table 5 shows correlations among financial variables. ROE has significant positive relationships with ROA, PM, and DR. Similarly, ROA has significant relationships with ROE, PM, and DR. It means that ROA and ROE are similar financial characteristics. From the table, we can see that ROE and DR have

a negative relationships, and the coefficient is  $-0.685$ . ROA and DR have a negative relationship, and the coefficient is  $-0.691$ . PM and DR have a negative relationship, and the coefficient is  $-0.685$ . ROA and ROE have a positive relationship, and the coefficient is  $0.947$ . ROA and PM have a positive relationship,

Table 5. Correlations among financial variables

	ROA	ROE	PM	TAT	EM	DR	CR	LNA
ROA	1							
ROE	0.947**	1						
PM	0.904**	0.918**	1					
TAT	0.622	0.545	0.545	1				
EM	-0.626	-0.539	-0.539	-0.023	1			
DR	-0.691*	-0.685*	-0.685*	0.071	0.908**	1		
CR	0.160	0.199	0.199	-0.477	-0.356	-0.507	1	
LNA	-0.333	-0.230	-0.230	-0.760*	-0.250	-0.344	0.547	1

\*  $p < 0.05$ , \*\*  $p < 0.01$ .

ROA : Return on asset, ROE : Return on equity, PM : Profit margin, TAT : Total asset turnover ratio, EM : Equity multiplier, DR : Debt equity ratio, CR : Current ratio, LNA : In asset.

and the coefficient is 0.904. ROE and PM have a positive relationship, and the coefficient is 0.918. The results show that ROA, ROE, and PM can be together in the DuPont model. Even though previous studies revealed that TAT is good indicator showing profitability, this study did not show that same result. Financial solvency reflected with DR, SR, and LNA. Also, this study revealed that there are strong relationships among three variables such as PM, ROA, and ROE meaning high level of management effectiveness and efficiency of investor's money can predict high level of profit margin. Interestingly, leverage(DR) shows significant association with four factors such as ROA(-0.691), ROE(-0.685), PM(-0.685), and EM(0.908).

## CONCLUSION & FURTHER RESEARCH

This study attempts to measure the financial performance of the food distribution company. In order to achieve the goal, this study have measured the ratios of ROE, ROA applying the DuPont analysis, which have been demonstrated with tables to show the change periodically. DuPont analysis is based on analysis of Return on Equity (ROE) & Return on Investment (ROI). The return on equity disaggregate performance into three components: Net Profit Margin, Total Asset Turnover, and the Equity Multiplier. This study emphasizes on the comparative ra-

tio analysis on 7 different food distribution firms. This study selected subjects of external audit firm on December 31st 2015. The selected firms are Shinsegae Food, CJ Freshway, Hyundai Green Food, Dae-sang Bestco, Foodmerce, Lotte Food, Dongwon Home Food. Our comparative study periods cover the three years from 2013 to 2015. All the analyzed data collected from the Data Analysis, Retrieval and Transfer System in financial supervisory service in Republic of Korea.

Following shows the discussions of four main results of this study: First, financial ratios of food distribution companies. Liquidity ratios measure a firm's ability to meet its current obligation showing 155.63, 143.28 and 135.36. They are used the financial soundness of a business and how well the company can satisfy its short and long obligations. The firms showed increasing value of leverage ratios (56.00, 62.14 and 67.60) showing lenders have priority over equity investors on an enterprise's assets. ROA measures firm's ability to turn assets into profit showing 4.04, 4.57, and 3.77 respectively. ROE is rate of return on investment by shareholders showing 7.82, 8.56, and 7.20 respectively. Second, operating margin ratio or return on sales ratio is the ratio of operating income of a business to its revenue. It is profitability ratio showing operating income as a percentage of revenue. Operating income is same as earnings before interest and tax (EBIT). Both operat-

ing income and revenue figures can be obtained from the income statement of a business. Except Daesang Bestco, all firms show positive ratio meaning most companies is profitable firm in its industry.

Third, leverage negatively and significantly effects on firms' financial performance in this study. This is supported by many previous studies which stated that an increase in the leverage has a negative impact on their performance. Companies that are highly leveraged may be at risk of bankruptcy if they are unable to make payments on their debt; they may also be unable to find new lenders in the future. In alignment with most previous studies, it was that low leverage might be beneficial, because highly leveraged firms may confront aggressive strategies from their less leveraged rivals and lose market share in an oligopoly product market. The higher debt level leads to less investment in capital assets, finally decreases firm value.

There are some limitations of this study that prevent us for further improvement: First of all, it would be the scope of the study that was limited to the 7 listed companies in Republic of Korea. The sample is small and it cannot represent different sectors of the economy. The findings may have been different if a larger sample was included, and the period studied from 2013 to 2015, it ranges quite small to show the long term impact of these variables to the financial performance. To overcome the scope of the study, for future research we suggest including a larger sample and extending the study period. Secondly, the annual data is also only the best we can obtain at this point.

## ACKNOWLEDGEMENTS

This research was supported by Kyungsung University Research Grants in 2016.

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Received: 18 September, 2016

Revised: 21 September, 2016

Accepted: 28 September, 2016