

**RATIO ANALYSIS FEATURING THE DUPONT METHOD:
AN OVERLOOKED TOPIC IN THE FINANCE MODULE OF
SMALL BUSINESS MANAGEMENT AND ENTREPRENEURSHIP COURSES**

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Submitted to

Small Business Institute Journal

The authors wish to acknowledge the valuable comments of two *SBIJ* reviewers

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INTRODUCTION

Many business students, along with a lot of small business management instructors, tend to shy away from quantitative analysis. The qualitative aspects of a business – such as generating novel product ideas and creating marketing campaigns– are far more “fun” than record keeping and financial analysis. However, there is much evidence that a lack of financial control is often a quick path to business failure.

According to Dun & Bradstreet’s *Business Failure Records (1994)*, “poor financial practices” is second only to “economic conditions” as a cause of business failures. Further, studies have been published as far back as 80 years ago (see Meech (1925)), as well as more recently (such as those published by Bruno, Leidecker, and Harder (1987); Gaskill, Van Auken, and Manning (1993); Lauzen (1985); and Wood (1989) that specifically cite poor financial control as a chief cause of unsuccessful businesses. Firer (1999), and more recently Kelly (2005), stress the importance of monitoring the “financial health” of a small business.

Consequently, it is vital that students of small business management and entrepreneurship become skilled at performing financial analyses. Students would benefit from a relatively simple tool for not only assessing how a particular small business is faring, but also for devising strategies for bottom line improvement. Such a tool exists in the form of financial ratio analysis, and in particular, an updated version of the classic Du Pont model.

The aim of this paper is to critically discuss and expand the role of ratio analysis, particularly the DuPont method, as an educational component of small business and/or entrepreneurial courses. To accomplish this purpose, the authors undertake a critical and

historical examination of the financial analysis literature and how ratio analysis is incorporated into small business management and entrepreneurship textbooks. Drawing the conclusion that the DuPont method is under-represented in the education of small business management students, the authors introduce the “really” modified DuPont model. The relevance of this model is, then, demonstrated through an example analysis, after which implications for the education of small business management students are discussed.

RATIO ANALYSIS

The use of financial ratios by financial analysts, lenders, academic researchers, and small business owners has been widely acknowledged in the literature for more than 40 years. (See, for example, Horrigan (1965), Edmister (1972), Osteryoung & Constand (1992), Devine & Seaton (1995), or Burson (1998). Financial ratios are used to determine a company’s strengths and weaknesses. A fundamental definition of any profit-seeking business is an entity that acquires resources in order to generate profits through the production and sale of goods and/or services. Ratios show important relationships between a firm’s resources and its financial flows. In a way, ratio analysis provides a “report card”. If the firm’s managers are doing a good job, they know it. If they are not doing a good job, not only will they know it, but they will also have a clear understanding of what they can do about it.

It would seem, then, that any course regarding small business would include a meaningful dialogue regarding the usefulness of ratio analysis in successfully managing a business. However, in a review of more than a dozen contemporary textbooks from the fields of Small Business Management, Entrepreneurship, and Entrepreneurial Finance, the authors discovered that the topic of Du Pont analysis is given short shrift (see Table 1). Even if financial ratio analysis was included in a given text, DuPont analysis was totally ignored in all but one.

Examining Table 1 it is easy to see that Small Business Management textbooks provide exposure to basic ratio analysis, but ignore DuPont. Entrepreneurship textbooks generally have a unit on finance, but often do not even include a discussion of ratio analysis. Only in Entrepreneurial Finance textbooks might one find the DuPont model mentioned and explained.

Textbook & Author(s)	Discipline	Covers Ratio Analysis	Covers DuPont Model
Small Business Management: A Planning Approach (Corman, Lussier, Pennel)	Small Business Management	Yes	No
Small Business Management: An Entrepreneurial Emphasis (Longnecker, Moore, and Petty)	Small Business Management	Yes	No
Small Business Management: An Entrepreneur's Guidebook (Megginson & Megginson)	Small Business Management	Yes	No
Small Business Management: Entrepreneurship and Beyond (Hatten)	Small Business Management	Yes	No
Small Business: An Entrepreneur's Business Plan (Ryan & Hiduke)	Small Business Management	Yes	No
Effective Small Business Management: An Entrepreneurial Approach (Scarborough & Zimmerer)	Small Business Management	Yes	No
Essentials of Entrepreneurship and Small Business Management (Zimmerer & Scarborough)	Small Business Management	Yes	No
Survivors Guide to Small Business (Townesley)	Small Business Management	No	No
New Venture Creation: Entrepreneurship for the 21 st Century (Timmons & Spinelli)	Entrepreneurship	No	No
Entrepreneurship (Lambing & Kuehl)	Entrepreneurship	No	No
Entrepreneurism: Exploring Entrepreneurship from a Business Perspective (Duening & Sherrill)	Entrepreneurship	No	No
Entrepreneurship: Successfully Launching New Ventures (Barringer & Ireland)	Entrepreneurship	No	No
Entrepreneurial Finance: Finance for Small Business (Adelman & Marks)	Entrepreneurial Finance	Yes	No
Entrepreneurial Financial Management: An Applied Approach (Cornwall, Vang, & Hartman)	Entrepreneurial Finance	Yes	Yes

Entrepreneurial Finance (Leach & Mellicher)	Entrepreneurial Finance	Yes	No
The Entrepreneur's Guide to Finance and Business (Rogers)	Entrepreneurial Finance	Yes	No
Entrepreneurial Finance (Smith & Smith)	Entrepreneurial Finance	No	No

Since there is so little exposure to the concept, unless small business management instructors provide supplemental DuPont lecture material or the small business management students learn the concept well enough in an introductory finance course, this extremely useful tool is totally overlooked.

While a complete discussion of the broad array of financial ratios and their interpretation is beyond the scope of this paper, a case is made for ensuring that students of small business management and/or entrepreneurship develop a level of comfort with, and understanding of, this critical analytical tool. This paper specifically concentrates on Du Pont analysis, a sub-portion of the ratio analysis methodology for monitoring and enhancing a business's profitability and "return". Arguably, profitability ratios address the most "bottom line" question of all: how is the business doing? Accordingly, the concepts of Return on Assets (ROA hereafter) and Return on Equity (ROE hereafter) provide the best understanding of the drivers of profitability for a business enterprise and the return to its owners. A "return on" ratio illustrates the relationship between profits and the investment needed to generate those profits. However, these concepts are often "too far removed from normal activities" to be easily understood and useful to many managers or small business owners. (Slater and Olson, 1996) But, what if a powerful, but easy-to-learn, tool for profitability analysis was right at our fingertips? Well, it is – namely, DuPont analysis.

THE DU PONT MODEL: A BRIEF HISTORY

Before discussing the mechanics and usefulness of Du Pont, it may be of some interest to learn about its development. The maturation of the Du Pont model parallels the progress made in the field of financial analysis itself. Three distinct versions of Du Pont have been created and used to help unravel the underlying drivers of profitability and return over time, beginning nearly 90 years ago.

In 1918, four years after he was hired by the E. I. du Pont Corporation of Wilmington, Delaware, to work in its treasury department, electrical engineer F. Donaldson Brown was given the task of untangling the finances of a company of which Du Pont had just purchased 23 percent of its stock. (This company was General Motors!) Brown recognized a mathematical relationship that existed between two commonly computed ratios, namely net profit margin (obviously a profitability measure) and total asset turnover (an efficiency measure), and ROA. The product of the net profit margin and the total asset turnover equals ROA, and this was the original Du Pont model, as illustrated in Equation 1 below.

Eq. 1: $(\text{net income} / \text{sales}) \times (\text{sales} / \text{total assets}) = (\text{net income} / \text{total assets})$ i.e. ROA

At this point in time maximizing ROA was a common corporate goal and the realization that ROA was impacted by both profitability and efficiency led to the development of a system of planning and control for all operating decisions within a firm. This became the dominant form of financial analysis until the 1970s (Blumenthal, 1998).

In the 1970s the generally accepted goal of financial management became “maximizing the wealth of the firm’s owners” (Gitman, 1998) and focus shifted from ROA to ROE. This led to the first major modification of the original Du Pont model. In addition to profitability and efficiency, the way in which a firm financed its activities, i.e. its use of debt or “leverage” became a third area of attention for financial managers. The new ratio of interest was called the

equity multiplier, which is determined by the equation (total assets / equity). The modified Du Pont model is shown in Equations 2 and 3 below.

Eq. 2: $ROA \times (\text{total assets} / \text{equity}) = ROE$

Eq. 3: $(\text{net income} / \text{sales}) \times (\text{sales} / \text{total assets}) \times (\text{total assets} / \text{equity}) = ROE$

The modified Du Pont model (also commonly known as the “Du Pont identity”) became a standard in all financial management textbooks and a staple of introductory and advanced courses alike as students encountered statements such as: “Ultimately, the most important, or “bottom line” accounting ratio is the ratio of net income to common equity (ROE)” (Brigham and Houston, 2001). The modified model was a powerful tool to illustrate the interconnectedness of a firm’s income statement and its balance sheet, and to develop straightforward strategies for improving the firm’s ROE. The Du Pont identity provides an excellent way to get a quick snapshot view of the overall performance of a firm in three critical areas of ratio analysis. (Isberg, 1998) This is not to say, however, that even the modified Du Pont model did not have its critics. At least one author (Boyd, 1989) argued that the Du Pont model did not adequately distinguish between “favorable” leverage and “unfavorable” leverage, based upon the impact of preferred stock in a firm’s capital structure. However, as Gitman (2000) points out, not many firms use preferred stock to raise capital and the leveraging effect of preferred stock is usually small. For small businesses in particular the use of preferred stock is very unlikely.

More recently, Hawawini and Viallet (1999) offered yet another modification to the Du Pont model. This modification resulted in five different ratios that combine to form ROE. In their modification they acknowledge that the financial statements firms prepare for their annual reports (which are of most importance to creditors and tax collectors) are not always useful to managers making operating and financial decisions. (Brigham and Houston) Hawawini and Viallet restructured the traditional balance sheet into a “managerial balance sheet” which is “a

more appropriate tool for assessing the contribution of operating decisions to the firm's financial performance." (Hawawini and Viallet, p. 68) This restructured balance sheet uses the concept of "invested capital" in place of total assets, and the concept of "capital employed" in place of total liabilities and owner's equity found on the traditional balance sheet. The primary difference is in the treatment of the short-term "working capital" accounts. The managerial balance sheet uses a net figure called "working capital requirement" (determined as: [accounts receivable + inventories + prepaid expenses] – [accounts payable + accrued expenses]) as a part of invested capital. These accounts then individually drop out of the managerial balance sheet. A more detailed explanation of the managerial balance sheet is beyond the scope of this paper, but will be partially illustrated in an example later in the paper.

The "really" modified Du Pont model is shown below in Equation 4.

$$\text{Eq. 4: } (\text{EBIT} / \text{sales}) \times (\text{sales} / \text{invested capital}) \times (\text{EBT} / \text{EBIT}) \times (\text{invested capital} / \text{equity}) \times (\text{EAT} / \text{EBT}) = \text{ROE}$$

Where: invested capital = cash + working capital requirement + net fixed assets

This "really" modified model still maintains the importance of the impact of operating decisions (i.e. profitability and efficiency) and financing decisions (leverage) upon ROE, but uses a total of five ratios to uncover what drives ROE and give insight to how to improve this important ratio.

The firm's operating decisions are those that involve the acquisition and disposal of fixed assets and the management of the firm's operating assets (mostly inventories and accounts receivable) and operating liabilities (accounts payable and accruals). These are captured in the first two ratios of the "really" modified Du Pont model. These are:

1. operating profit margin: (Earnings Before Interest & Taxes or EBIT / sales)
2. capital turnover: (sales / invested capital)

The firm's financing decisions are those that determine the mix of debt and equity used to fund the firm's operating decisions. These are captured in the third and fourth ratios of the "really" modified model. These are:

3. financial cost ratio: (Earnings Before Taxes or EBT / EBIT)
4. financial structure ratio: (invested capital / equity)

The final determinant of a firm's ROE is the incidence of business taxation. The higher the tax rate applied to a firm's EBT, the lower its ROE. This is captured in the fifth ratio of the "really" modified model.

5. tax effect ratio: (Earnings After Taxes or EAT / EBT)

The relationship that ties these five ratios together is that ROE is equal to their combined product (see Equation 4.).

RECENT EVIDENCE OF DU PONT MODEL APPLICATION

Prendergast (2006) and Milbourn & Haight (2005) present examples of using Du Pont analysis in both a business and classroom setting. Prendergast illustrates how a "modified Du Pont approach to ratio analysis can be used to drill down to the true cause of financial performance problems" in a small manufacturing business (p. 48). Milbourn & Haight show the use of "Du Pont Analysis as a teaching aid to equip students with an understanding of how management decisions influence the bottom line" (p. 46). Unfortunately, the Milbourn & Haight paper is concerned exclusively with only the original Du Pont model, i.e. it shows the drivers of no more than Return on Assets. We will show the impact and value of the Du Pont model drivers on Return on Equity.

 EXAMPLE OF APPLYING THE “REALLY” MODIFIED DU PONT MODEL

To illustrate how the model works, consider the income statement and balance sheet for the fictitious small firm of Herrera & Company, LLC.

Income Statement

Net Sales	\$766,990
Cost of Goods Sold	(560,000)
Selling, General, & Administrative Expenses	(143,342)
Depreciation Expense	<u>(24,000)</u>
Earnings Before Interest & Taxes	\$ 39,648
Interest Expense	<u>(12,447)</u>
Earnings Before Taxes	\$ 27,201
Taxes	<u>(8,000)</u>
Earnings After Taxes (net profit)	<u>\$ 19,201</u>

Balance Sheet

Cash	\$ 40,000	Notes Payable	\$ 58,000
Pre-paid Expenses	12,000	Accounts Payable	205,000
Accounts Receivable	185,000	Accrued Expenses	<u>46,000</u>
Inventory	<u>200,000</u>	Current Liabilities	\$309,000
Current Assets	\$437,000	Long-Term Debt	
Land/Buildings	160,000	Mortgage	104,300
Equipment	89,000	8-Year Note	63,000
Less: Acc. Depreciation	<u>(24,000)</u>	Owner's Equity	<u>185,700</u>
Net Fixed Assets	<u>\$225,000</u>	Total Liabilities & Equity	<u>\$662,000</u>
Total Assets	<u>\$662,000</u>		

Computation of ROE

1. Operating Profit Margin = $\$39,648 / \$766,990 = .0517$
2. Capital Turnover = $\$766,990 / *\$411,000 = 1.8662$
3. Financial Cost Ratio = $\$27,201 / \$39,648 = .6861$
4. Financial Structure Ratio = $\$411,000 / \$185,700 = 2.2132$
5. Tax Effect Ratio = $\$19,201 / \$27,201 = .7059$

$$\text{ROE} = .0517 \times 1.8662 \times .6861 \times 2.2132 \times .7059 = **.1034 \text{ or } 10.34\%$$

* Invested Capital = Cash (\$40,000) + Working Capital Requirement [$\$185,000 + \$200,000 + \$12,000$] – [$\$205,000 + \$46,000$] (or \$146,000) + Net Fixed Assets (\$225,000) = \$411,000

** Note that this is the same as conventional computation of ROE: $\$19,201 / \$185,700 = .1034$

CONCLUSION & IMPLICATIONS

The Du Pont model of analysis requires no more than a few simple calculations, well within the ability of any student, manager, or small business owner. The potential reward for taking the time to make these calculations is great. Who would not want to know precise actions that can be taken that will lead to higher profitability and return? Even the original model (culminating in ROA) provides valuable insights on return, but the more refined versions that break out the components of ROE allow even novice small business managers to make sound financial decisions that will have a positive impact on the return to firms' owners.

In particular, the “really” modified Du Pont model of ratio analysis can demystify relatively complex financial analysis and put strategic financial planning at the fingertips of any small business owner or manager who takes the (relatively little) time needed to understand it. Because it links several critical ratios, the Du Pont method allows one to examine how a firm generates its return to its owners, i.e. its ROE. Each operating and financial decision can be made within a framework of how that decision will impact ROE. Easily set up on a computer model (such as a spreadsheet), one can see how decisions “flow through” to the bottom line, which facilitates coordinated financial planning (Harrington & Wilson, 1986).

For example, what if Herrera & Company can reduce its cost of goods sold by just 1%? This would reduce COGS by \$5,600, resulting in a new cost of goods of \$554,400. Such savings is certainly well within the realm of possibility given opportunities to use alternate suppliers or seek quantity discounts. Plugging the new value of COGS into the spreadsheet elicits the following effects:

	766,99
Net Sales	0
Cost of Goods Sold	554400
Selling, General, & Admin	143,34
Exp	2
Depreciation expense	24000
EBIT	45,248
Interest Expense	12447
EBT	32,801
Taxes	8000
Net Profit	24,801

Cash	40000	Notes Payable	58000
Pre-paid Expenses	12000	Accts Payable	205000
Accts Rec	185000	Accrued Expenses	46000
Inventory	200000	Current Liabilities	309000
Current assets	437000	Long-term Debt	
Land/Buildings	160000	Mortgage	104300
Equipment	89000	8-year Note	63000
Less: Accumulated Deprec	24000	Owner's Equity	185700
		Total Liabilities &	
Net Fixed assets	225000	Equity	662000
Total assets	662000		
Invested capital	411000		
operating margin	0.0590		
capital turnover	1.8662		
financial cost ratio	0.7249		
financial structure ratio	2.2132		
tax effect ratio	0.7561		
DuPont-Generated ROE	0.1336		

Notice that ROE jumps from .1034 to .1336 - an increase of more than 29%! This is due to increases in the operating margin from .0517 to .0590, the financial cost ratio from .6861 to .7249, and the tax effect ratio from .7059 to .7561. This illustration would be very useful for a small business manager and/or owner to explain how controlling costs even a little bit can have a large impact on the firm's returns.

Similar, although not always quite as dramatic, results occur with changes in each of the

four other components of the “really modified” Du Pont formula. In the interests of space, we summarize these in the following set of examples.

The capital turnover ratio (Net Sales / Invested Capital) can be altered primarily by being more efficient and, thus, using less assets in the business’s operations. However, it will only make a difference in ROE if the reduction in assets is accompanied by an equivalent reduction in owner’s equity. For example, if Herrera & Company could reduce its inventory by 10% (from \$200,000 to \$180,000) and as a result the owners take out \$20,000 of their own equity (reducing owners’ equity from \$187,500 to \$167,500) the following changes occur:

Invested capital	391000
operating margin	0.0590
capital turnover	1.9616
financial cost ratio	0.7249
financial structure ratio	2.3597
tax effect ratio	0.7561
DuPont-Generated ROE	0.1497

The financial cost ratio and financial structure ratio are both impacted by the amount of debt used and are so closely connected that it is best to look at them in tandem. In this example, suppose that Herrera & Company can borrow up to 25% more on its 8-year note without an increase in the interest rate it is paying the bank. That would mean the company would be borrowing \$78,750 rather than \$63,000 on the note. Again, they would reduce owner’s equity by an equivalent amount. Further, interest expenses would increase by roughly \$500 from \$12,447 to \$12,947. The results of these changes are:

operating margin	0.0590
capital turnover	1.8662
financial cost ratio	0.7139
financial structure ratio	2.4184
tax effect ratio	0.7523
DuPont-Generated ROE	0.1430

Finally, the tax effect ratio (Earnings After Tax / Earnings Before Tax) can also be potentially manipulated by management. Taking advantage of any tax incentives offered by Federal, State, or Local governments would help improve ROE. For example, if Herrera & Company was able to get a \$250 tax incentive for creating a full-time position for a minority worker or for using some sort of “green” component to its operations, their taxes would be reduced from \$8,000 to \$7,500 and the following would occur:

operating margin	0.0590
capital turnover	1.8662
financial cost ratio	0.7249
financial structure ratio	2.2132
tax effect ratio	0.7637
DuPont-Generated ROE	0.1349

As one can easily see, using the “really modified” Du Pont model allows a small business owners/managers to scrutinize how their operating, financing, and investing decisions impact the infamous “bottom line”. If the goal is to maximize the wealth of a firm’s owners, then this is a tool that ought to be in every owner’s or manager’s personal toolkit.

The five-ratio “really” modified DuPont model mitigates a major criticism of the traditional Du Pont model, namely that the model consists of very general measures (e.g. total assets is the most broad of asset measures) and the lack of detailed measures could lead to a misunderstanding of the true performance of a firm. The “really” modified Du Pont model, with the use of invested capital from the managerial balance sheet and the use of operating profit margin rather than net profit margin in determining ROE provides the finer detail Du Pont critics claim is lacking.

Sound financial statement analysis should be an integral part of not only the management process of any firm seeking to optimize the return to its owners, but also any educational

program that purports to be training the small business managers who will be running these firms. By identifying strengths and/or weaknesses in five possible areas, the “really” modified Du Pont model enables the analyst to quickly focus his or her attention to a more detailed study of particular aspects of a firm’s operations. We argue that the subsequent inquiry will be both easier and more meaningful within the Du Pont framework. With the assumed goal of improving ROE, we offer the following:

In its simplest form, we can say that to improve ROE the only choices one has are to increase operating profits, become more efficient in using existing assets to generate sales, recapitalize to make better use of debt and/or better control the cost of borrowing, or find ways to reduce the tax liability of the firm. Each of these choices leads to a different financial strategy.

For example, to increase operating profits one must either increase sales (in a higher proportion than the cost of generating those sales) or reduce expenses. Since it is generally more difficult to increase sales than it is to reduce expenses, a small business owner can try to lower expenses by determining: 1) if a new supplier might offer equivalent goods at a lower cost, or 2) if a website might be a viable alternative to a catalog, or 3) can some tasks currently being done by outsiders be done in-house. In each case net income will rise without any increase in sales and ROE will rise as well.

Alternatively, to become more efficient, one must either increase sales with the same level of assets or produce the same level of sales with fewer assets. A small business owner might then try to determine: 1) if it is feasible to expand store hours by staying open later or on weekends, or 2) if a less expensive piece of equipment is available that could replace an existing (more expensive) piece of equipment, or 3) if there is a more practical way to produce and/or deliver goods or services than is presently being used, or 4) whether a “sale and leaseback” arrangement with one or more fixed assets is feasible.

Further, small business owners can determine if they are using debt wisely. Refinancing an existing loan at a cheaper rate will reduce interest expenses and, thus, increase ROE. Exercising part of an unused line of credit can increase the financial structure ratio with a corresponding increase in ROE. And, taking advantage of tax incentives that are often offered by federal, state, and local taxing authorities can increase the tax effect ratio, again with a commensurate increase in ROE.

In conclusion, ROE is the most comprehensive measure of profitability of a firm. It considers the operating and investing decisions made as well as the financing and tax-related decisions. The “really” modified Du Pont model dissects ROE into five easily computed ratios that can be examined for potential strategies for improvement. It should be a tool that all business owners, managers, and consultants have at their disposal when evaluating a firm and making recommendations for improvement. A good place to start is to include the concept in the financial management chapters of all small business management/entrepreneurship textbooks, as well as in the financial management units of all small business management/entrepreneurship courses.

REFERENCES

- Blumenthal, R. G. *'Tis the gift to be simple: Why the 80-year-old Du Pont model still has fans*, CFO Magazine, January, 1998, pp. 1-3.
- Brigham, E. F. and Houston, J. F. *Fundamentals of Financial Management, Concise Third Edition*, Harcourt Publishers, 2001.
- Boyd, G. M. *Some suggestions for a "new and improved" Du Pont model*, Journal of Financial Education, Fall 1989, pp. 29-32.
- Bruno, A, Leidecker, J. and Harder, J. *Why firms fail* Business Horizons, March/April 1987, pp.50-58.
- Burson, R. *Tools you can use for improved ratio analysis*, San Diego Business Journal, 12/07/98, Vol. 19, Issue 49, pp. 19-23.
- Devine, K. and Seaton, L. *An examination of quarterly financial ratio stability: implications for financial decision making*, Journal of Applied Business Research, Winter, 1995, pp. 81-98.
- Dun & Bradstreet, *Business Failure Record*, New York, 1994.
- Edmister, R. O. *Financial ratios as discriminant predictors of small business failure* , Journal of Finance, Vol. 27, No. 1, March, 1972, pp. 139-140.
- Firer, C. *Driving financial performance through the Du Pont identity: A strategic use of financial analysis and planning*, Financial Practice and Education, Spring/Summer 1999, pp. 34-45.
- Gaskill, L., Van Auken, H and Manning, R. *A factor analytic study of the perceived causes of small business failure*, Journal of Small Business Management, 1993, 31, pp. 18-31.
- Gitman, L. J. *Principles of Financial Management, 8th Edition*, Addison Wesley Publishers, 2000.
- Harrington, D. and Wilson, B. *Corporate Financial Analysis* , Business Publications, Inc. 1986.
- Hawawini, G. and Viallet, C. *Finance for Executives*, South-Western College Publishing, 1999.
- Horrigan, J. O. *Some empirical bases of financial ratio analysis* , The Accounting Review, Vol. 40, No. 3, July 1965, pp. 558-568.
- Isberg, S. C. *Financial analysis with the Du Pont ratio: A useful compass* , Credit & Financial Management Review, Second Quarter, 1998, pp. 1-4.
- Kelly, S.. *Company health check*, Accountancy Ireland, Vo. 37, No. 4, August, 2005, pp. 52-53.
- Lauzen, L. *Small business failures are controllable*, Corporate Accounting, Summer, 1985, pp.

34-38.

Meech, S. P. *Financial standards* , The University Journal of Business, Vol. 3, No. 2, March, 1925, pp. 171-187.

Milbourn, G. and Haight, T. *Providing students with an overview of financial statements using the Dupont analysis approach* , The Journal of American Academy of Business, March, 2005, pp. 46-50.

Osteryoung, J. and Constand, R. *Financial ratios in large public and small private firms* , Journal of Small Business Management, July, 1992, pp. 35-47.

Prendergast, P. *Financial analysis: how a “modified DuPont approach” to ratio analysis can be used to drill down to the true cause of financial performance problems*, Financial Management, Paper P8, May, 2006, pp. 48-49.

Slater, S. and Olson, E. *A value-based management system*, Business Horizons, September/October, 1996, pp. 48-52.

Wood, D. L. *Why new businesses fail and how to avoid disaster*, Corporate Cashflow, August 1989, pp. 26-27.