Supply Chain Financial Analysis

Jarrod Goentzel

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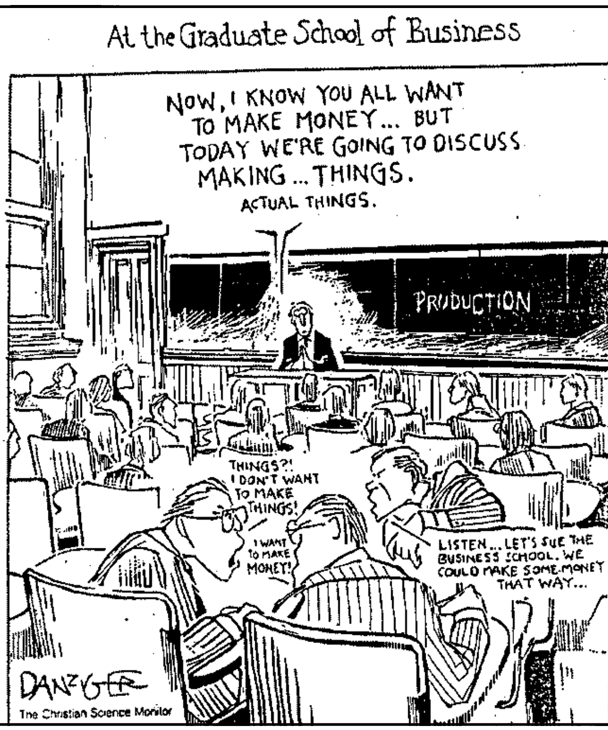
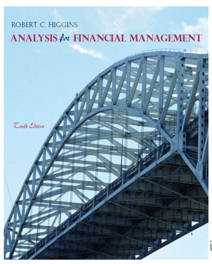


The first principle in a common MBA finance textbook

“A company’s finances and operations are integrally connected.”



Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011

Why is operations undervalued?

- “In our company, operations is not glamorous. Deals are.”
- Operations is a branch of engineering requiring a different skill set and mindset
- Top managers – who entered through finance, strategy, or marketing – are ignorant about operations and uninterested in learning more, relying on others to mind the details of actual work
- “Financial data dominate the discourse in the modern organization, although operational performance is the driver of financial results.”

Source: “Deep Change: How Operational Innovation Can Transform Your Company,” Michael Hammer, *Harvard Business Review*, Vol. 82 Issue 4, April 2004, pp. 84-93.

Answer these questions for your firm

- What financial KPIs do you use to measure supply chain performance?
- What financial analysis do you use to make supply chain decisions?

The Language of Finance

The language of finance

- Financial Statements
  - Balance Sheet
  - Income Statement
- Financial Analysis
  - Ratios
  - Acronyms (ROA, ROIC, EVA,…)

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Balance Sheet

- Snapshot of the firm's value
  - Approximation: accountants measured value at the time the transaction took place
  - Book value is the lower of cost or market value
- Assets (listed in order of liquidity)
  - Current: cash, marketable securities, accounts receivable, inventories — consumed in the current year
  - Fixed: property, plant, equipment (less accumulated depreciation) — consumed in the future
  - Intangible: patents, goodwill…"growth assets" — consumed theoretically
- Liabilities (listed in order in which they must be paid)
  - Current: accounts payable, notes payable,…
  - Long-term: notes, bonds, deferred income taxes,…
- Shareholders' equity (a.k.a. net worth)
  - Stock: preferred, common
  - Retained earnings

Last to be paid if a firm is dissolved

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Income Statement

- Performance record between snapshots
- Explains why retained earnings has changed over time

  - Sales (net of markdowns)
  - Cost of goods sold
  - GROSS INCOME
  - Selling, general & administrative (SGA) expenses
  - OPERATING INCOME — EBITDA
  - Depreciation & amortization
  - OPERATING INCOME — EBIT
  - Interest expense
  - Other nonoperating expenses/income
  - Income taxes
  - Extraordinary items
  - NET INCOME — EIATBS

Financial statements

"Financial statements are like fine perfume; to be sniffed but not swallowed."

– Abraham Brilloff

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

Financial analysis

"accountants try to measure the current standing and immediate past performance of a firm, whereas financial analysis is much more forward looking."

– Aswath Damodaran, Stern School of Business

Source: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/AccPrimer/accstate.htm

Financial analysis

- Analogy about managing a company's financial performance – stick, throttle, rudder
- "We analyze financial statements for the purpose of
  - evaluating performance and
  - understanding the levers of management control."

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

Financial analysis

- Higgins' three levers of management control
  - Net margin: Net income / Sales
  - Asset turnover: Sales / Assets
  - Financial leverage: Assets / Shareholders' equity
- Study the "ties between a company's operating decisions…and its financial performance."
  - "Operating decisions are the levers by which management controls financial performance."
  - Examples given: how many units to make this month, how to price them

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

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DuPont analysis

- DuPont analysis is based on a return-on-investment formula developed in 1914 by a DuPont explosives salesman named Donaldson Brown and used by the company. Mr. Brown later used it as CFO at General Motors, but it was already known as the DuPont formula.

$$R = T \times P$$

where
R = rate of return on capital invested,
T = rate of turnover of invested capital, and
P = percentage of profit on sales

Donaldson Brown at DuPont Corporation c. 1920 (Source: http://heritage.dupont.com)

Donaldson Brown c. 1955 (Source: Some Reminiscences of an Industrialist, 1977))

- In essence, it is a simple combination of two ratios

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Source: Flesher, D. L., & Previts, G. J. (2013). Donaldson Brown (1885-1965): the power of an individual and his ideas over time. *The Accounting Historians Journal*, 79-101.

DuPont analysis

Gross or Operating Margin is a more common metric for supply chain professionals than Net Margin

Inventory Turnover, a narrower focus than Asset Turnover, is often a metric for supply chain professionals

$$\text{Net margin} = \frac{\text{Net income}}{\text{Sales}} \qquad \text{Asset turnover} = \frac{\text{Sales}}{\text{Total assets}}$$

$$\text{ROA} = \text{Net margin} \times \text{Asset turnover}$$

$$\text{Financial leverage} = \frac{\text{Total assets}}{\text{Equity}}$$

$$\text{ROE} = \text{Net margin} \times \text{Asset turnover} \times \text{Financial leverage}$$

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DuPont analysis

- The DuPont formula is:

$$ROA = Net\ Margin \times Asset\ Turnover$$

$$Net\ Margin = \frac{Net\ Income}{Sales} \qquad Asset\ Turnover = \frac{Sales}{Total\ Assets}$$

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DuPont analysis

- The formula commonly used today focuses on ROE and incorporates financial leverage

$$ROE = Net\ Margin \times Asset\ Turnover \times Financial\ Leverage$$

$$Net\ Margin = \frac{Net\ Income}{Sales}$$

$$Asset\ Turnover = \frac{Sales}{Total\ Assets}$$

$$Financial\ Leverage = \frac{Total\ Assets}{Equity}$$

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GMROI

- GMROI = Gross Margin Return On Inventory Investment

$$GMROI = Gross\ Margin \times Inventory\ Turnover$$

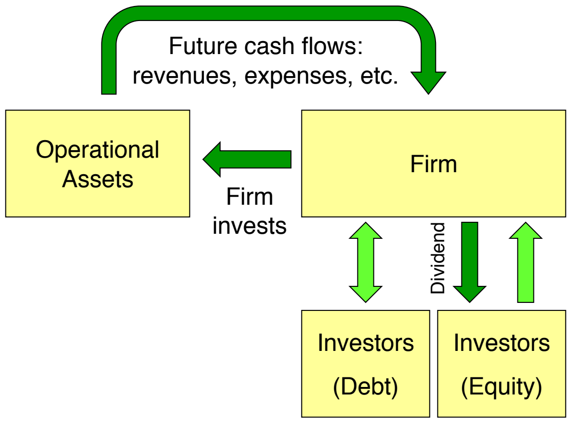
$$Gross\ Margin = \frac{Gross\ Profit}{Sales}$$

$$Inventory\ Turnover^{*} = \frac{Sales}{Inventory}$$

$*$ *this version of the ratio does not use COGS as the numerator*

- Narrower focus than DuPont
- Useful in evaluating inventory decisions, and their impact on profitability

Finance and supply chain work together to create stockholder value



Operations / supply chain: use funds to generate returns

Finance: allocate funds

Finance: acquire funds

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Levers of performance for 10 diverse companies, 2010

	Return on Equity (ROE) (%)	=	Profit Margin (P) (%)	×	Asset Turnover (A) (times)	×	Financial Leverage (T) (times)
Adobe Systems	14.9	=	20.4	×	0.47	×	1.57
Chevron	18.1	=	10.0	×	1.03	×	1.76
Google	18.4	=	29.0	×	0.51	×	1.25
Hewlett-Packard	21.7	=	7.0	×	1.01	×	3.08
JPMorgan Chase	10.3	=	15.0	×	0.054	×	12.58
Norfolk Southern	14.0	=	15.7	×	0.34	×	2.64
Novartis	15.5	=	19.3	×	0.41	×	1.95
Safeway	11.8	=	1.42	×	2.71	×	3.03
Sensient Technologies	10.9	=	8.1	×	0.83	×	1.63
Southern Company	12.6	=	11.7	×	0.32	×	3.40

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

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Overall measure of financial performance

- Is there a single metric that can reflect the firm's financial performance for investors?
- for executives?

- Return on Equity $$ROE = \frac{Net\ Income}{Equity}$$
- Return on Assets $$ROA = \frac{Net\ Income}{Total\ Assets}$$

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Specific measures of financial performance

- Revenue growth
  - Sales growth = (Salest / Salest-1) - 1
  - Compound Annual Growth Rate (CAGR) = (Salest / Salest-n)1/n - 1
- Operating margin
  - Gross margin = Gross Income / Sales
  - Operating margin = Operating Income / Sales
  - Net margin = Net Income / Sales
- Asset productivity
  - Asset turnover = Sales / Total Assets
  - Inventory turnover = COGS / Average Inventory
  - Accounts receivable turnover = Credit Sales / Average Accounts Receivable
  - Accounts payable turnover = COGS / Average Accounts Payable
  - Days of inventory outstanding = Average Inventory / (COGS/365)

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Principal ratio definitions (Higgins)*

Profitability Ratios		
Return on equity	=	**Net income/Shareholders' equity**
Return on assets	=	Net income/Assets
Return on invested capital	=	$\frac{\text{Earnings before interest and taxes} \times (1 - \text{Tax rate})}{\text{Interest-bearing debt} + \text{Shareholders' equity}}$
Profit margin	=	**Net income/Sales**
Gross margin	=	Gross profit/Sales
Price to earnings	=	Price per share/Earnings per share
Turnover-Control Ratios		
Asset turnover	=	**Sales/Assets**
Fixed-asset turnover	=	Sales/Net property, plant, and equipment
Inventory turnover	=	Cost of goods sold/Ending inventory
Collection period	=	Accounts receivable/Credit sales per day (If credit sales unavailable, use sales)
Days' sales in cash	=	Cash and securities/Sales per day
Payables period	=	Accounts payable/Credit purchases per day (If purchases unavailable, use cost of goods sold)

* Excluding the leverage and liquidity ratios

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

Option to add working capital

Ratios depend on the industry

(upper quartile, median, lower quartile)

Lines of Business and Number of Firms Reporting	Current Ratio (times)	Total Liabilities to Net Worth (%)	Collection Period (days)	Net Sales to Inventory (times)	Total Assets to Net Sales (%)	Profit Margin (%)	Return on Assets (%)	Return on Equity (%)
Retail trade:								
Department stores (66)	5.8	20.3	1.5	6.8	36.0	3.8	7.8	13.8
	3.3	**47.5**	**6.4**	**4.8**	**54.7**	**2.0**	**3.6**	**4.2**
	2.1	110.8	16.8	2.8	74.1	(0.1)	-	(0.1)
Grocery stores (185)	3.0	33.1	1.1	34.3	15.9	2.6	11.9	25.9
	1.9	**95.1**	**3.3**	**19.8**	**22.1**	**1.3**	**4.6**	**11.5**
	1.3	213.5	6.9	13.7	35.2	0.4	1.9	4.1
Jewelry stores (114)	6.0	22.1	1.5	3.2	47.2	4.7	8.0	15.0
	3.1	**55.4**	**13.9**	**2.2**	**74.4**	**1.0**	**1.5**	**3.0**
	1.8	142.3	30.7	1.6	100.8	(1.3)	(1.7)	(1.6)
Services:								
Hotels and motels (84)	3.1	26.0	3.3	169.3	72.0	7.7	6.6	17.8
	1.1	**151.4**	**6.6**	**108.9**	**176.2**	**1.5**	**1.2**	**5.8**
	0.6	339.1	17.9	34.9	275.5	(9.3)	(3.2)	(2.3)
Prepackaged software (195)	2.6	35.7	37.6	212.3	54.4	9.4	10.0	21.8
	1.5	**62.7**	**55.9**	**48.2**	**98.3**	**1.4**	**1.2**	**3.8**
	0.8	126.7	78.7	15.9	177.3	(15.3)	(18.7)	(7.7)
College and universities (108)	2.9	29.1	17.0	208.1	191.1	10.0	2.9	5.5
	1.9	**54.1**	**28.5**	**98.9**	**310.1**	**1.8**	**0.6**	**1.1**
	1.3	89.5	50.6	44.1	437.9	(8.3)	(2.0)	(3.4)

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

Ratios depend on the industry

(upper quartile, median, lower quartile)

Lines of Business and Number of Firms Reporting	Current Ratio (times)	Total Liabilities to Net Worth (%)	Collection Period (days)	Net Sales to Inventory (times)	Total Assets to Net Sales (%)	Profit Margin (%)	Return on Assets (%)	Return on Equity (%)
Agriculture, forestry, and fishing:								
Ornamental nursery products (35)	5.2	17.5	10.2	13.8	46.6	5.5	8.1	17.5
	2.4	**76.6**	**23.9**	**7.1**	**75.5**	**1.7**	**2.7**	**3.8**
	1.2	164.6	46.0	4.2	94.6	(1.3)	(3.7)	(1.6)
Lawn and garden services (144)	4.1	33.2	19.4	135.9	25.4	6.2	16.3	27.7
	2.2	**71.1**	**35.8**	**42.2**	**37.0**	**2.0**	**5.1**	**11.7**
	1.4	164.1	57.3	16.8	50.3	0.1	0.2	1.0
Manufacturing:								
Chemicals and allied products (609)	4.2	28.7	26.7	14.3	58.1	7.3	8.3	19.1
	2.4	**70.4**	**42.9**	**8.5**	**105.0**	**1.0**	**0.8**	**5.2**
	1.4	175.1	59.3	5.1	194.0	(30.8)	(24.0)	(21.5)
Motors and generators (25)	3.0	31.4	26.3	9.4	49.3	7.8	7.7	12.5
	2.3	**98.7**	**42.0**	**5.7**	**77.9**	**0.5**	**0.7**	**(6.6)**
	0.9	244.9	51.5	2.8	255.1	(194.0)	(35.6)	(87.0)
Semiconductors and related devices (152)	6.4	16.4	34.2	11.1	92.4	8.3	6.4	9.5
	3.7	**32.0**	**47.5**	**7.6**	**136.5**	**(2.6)**	**(1.4)**	**(1.4)**
	2.0	82.7	66.1	5.2	184.0	(24.8)	(17.6)	(22.4)
Process control instruments (53)	7.7	13.3	38.0	10.9	35.8	8.4	16.0	28.2
	3.7	**38.5**	**48.6**	**7.4**	**54.3**	**3.9**	**7.3**	**10.1**
	2.3	84.0	64.6	4.4	78.6	0.1	0.2	0.6
Wholesale trade:								
Sporting and recreational goods (72)	4.2	27.6	15.5	14.1	20.6	4.4	14.1	23.2
	2.3	**59.7**	**29.9**	**6.8**	**32.7**	**1.8**	**5.8**	**11.9**
	1.4	186.1	46.4	4.5	51.2	0.2	0.6	1.6
Women's and children's clothing (56)	3.4	55.6	25.9	15.1	22.7	5.2	17.2	50.7
	1.9	**139.9**	**37.2**	**9.0**	**34.3**	**2.0**	**6.7**	**21.1**
	1.4	304.2	53.7	5.5	44.5	0.4	1.5	4.4

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

Ratio analysis advice

- There are not any “correct” values for ratios
- Ratio values need to be understood in context
  - Compare with industry averages
  - Compare with specific competitors
  - Observe trends over time
- Develop a framework of several ratios to monitor
- In combination, these clues may tell an interesting story

Using ratios effectively

- Ratio values need to be understood in context
- Usually, no “correct” values for ratios
- Rely on rule of thumb assessment techniques, comparison with industry averages and specific competitors, and looking for trends

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

You are now ready to be CEO

Sunflower Nutraceutical (SNC)
Simulation

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Sunflower Nutraceutical (SNC)

- How did you like being CEO?
- What was your objective in making decisions (in rank order)?
- What approaches did you use to evaluate options?

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Sunflower Nutraceutical (SNC) results

Two goals of the CEO

- Provide Shareholder Value
- …and stay out of jail

Bernard J. "Bernie" Ebbers co-founded the telecommunications company WorldCom and was the CEO. In 2005, he was sentenced to 25 years in prison for his role in the $11 billion accounting fraud that brought down the company.

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Ebbers gets 25 years

Former WorldCom chief, 63 years-old, could spend the rest of his life in prison.

July 13, 2005: 10:49 PM EDT

By Krysten Crawford, CNN/Money staff writer

NEW YORK (CNN/Money) - Ex-WorldCom chief executive Bernard Ebbers was sentenced Wednesday to 25 years in prison for his role in orchestrating the biggest corporate fraud in the nation's history.

Legal experts said the sentence, effectively a life term for the 63-year-old, appears to be the longest ever for a CEO found guilty of committing corporate crimes while running a Fortune 500 company.

Ebbers was convicted in March for his part in the $11 billion accounting fraud at WorldCom that was the biggest in a wave of corporate scandals at Enron, Adelphia and other companies.

WorldCom, now known as MCI, filed the largest bankruptcy in U.S. history in 2002. The company's collapse led to billions of dollars in losses for shareholders and employees.

Ebbers was convicted in March of nine felonies that carried a maximum prison term of 85 years.

Tough to cope

On an overcast mid-summer day, Ebbers sat motionless grasping a tissue and wiping away tears as his sentence was read. After the hearing ended, Ebbers and his wife Kristie, both in tears, hugged in the courtroom, according to a CNN correspondent who was there.

CNN

Ebbers, on his way to be sentenced Wednesday morning, pushed a photographer out of his way.

Special Report | full coverage

SCANDAL, INC

Former KPMG executives indicted

Adelphia, Boies firm part ways

HealthSouth ex-CFO gets 3 months in jail

Balanced Scorecard

- "Ultimately, causal paths from all the measures on a Scorecard should be linked to financial objectives."
- "We have found that companies use three financial themes to achieve their business strategies:
  - Revenue Growth and Mix
  - Cost Reduction / Productivity Improvement
  - Asset Utilization / Investment Strategy"

Source: Kaplan, R. S., & Norton, D. P. (1996). Linking the balanced scorecard to strategy. *California management review*, *39*(1), 53-79.

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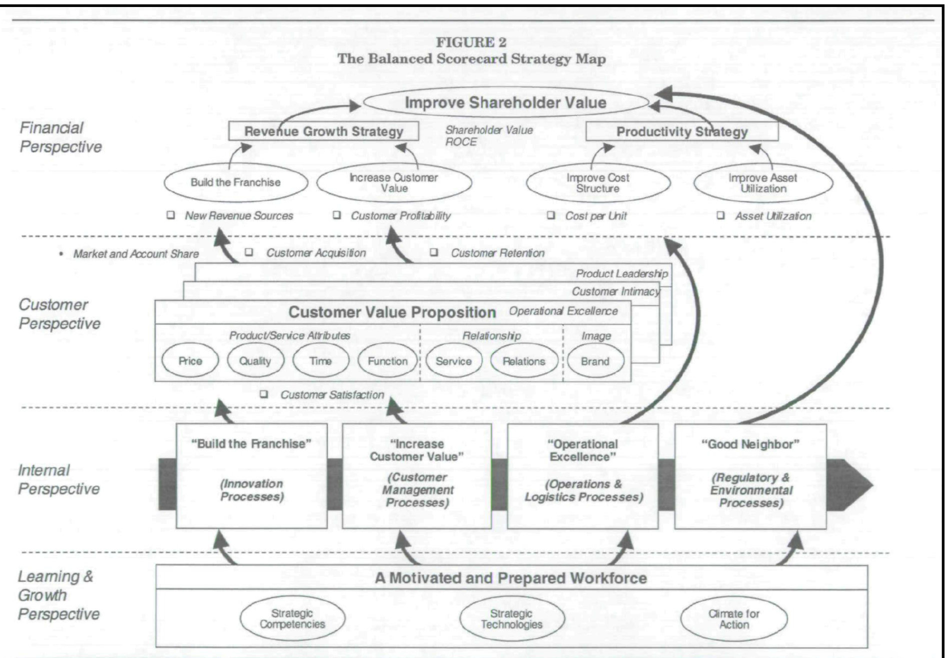

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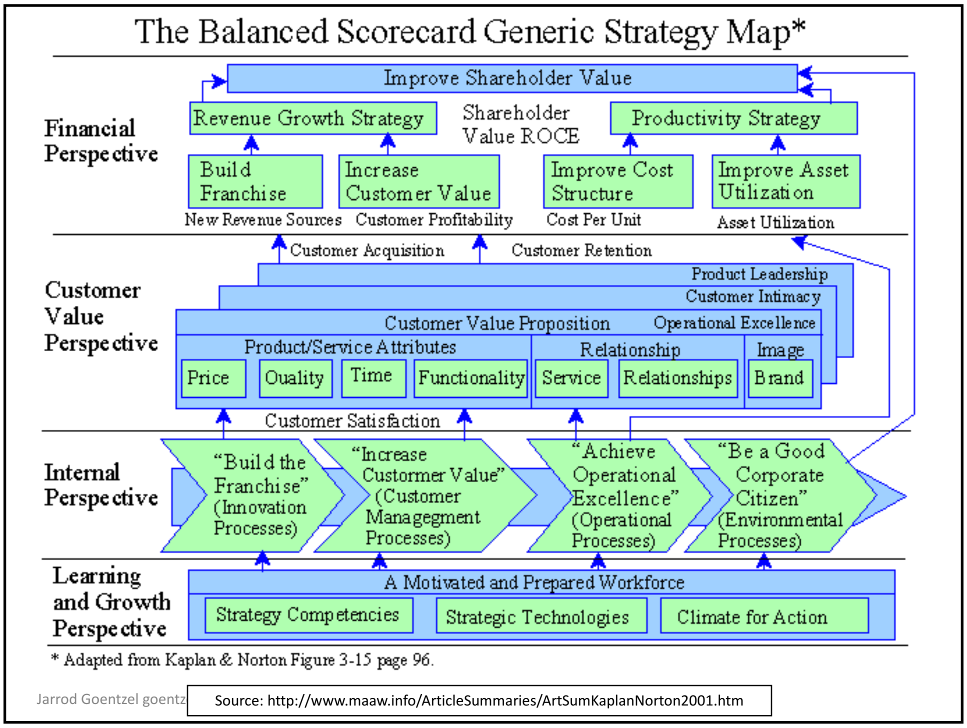
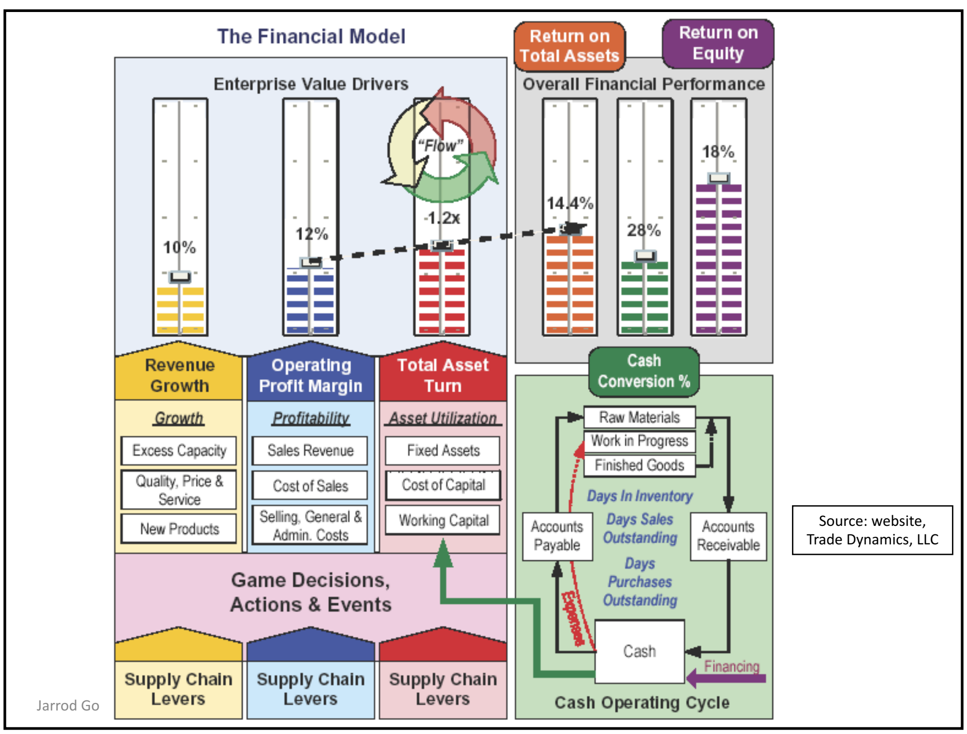
Source: Kaplan, R. S., & Norton, D. P. (2001). Transforming the balanced scorecard from performance measurement to strategic management: Part I. *Accounting horizons*, *15*(1), 87-104.


The Balanced Scorecard Generic Strategy Map*
Financial Perspective
Improve Shareholder Value
Revenue Growth Strategy
Shareholder Value ROCE
Productivity Strategy
Build Franchise
Increase Customer Value
Improve Cost Structure
Improve Asset Utilization
New Revenue Sources
Customer Profitability
Cost Per Unit
Asset Utilization
Customer Value Perspective
Customer Acquisition
Customer Retention
Product Leadership
Customer Intimacy
Customer Value Proposition
Operational Excellence
Product/Service Attributes
Relationship
Image
Price
Quality
Time
Functionality
Service
Relationships
Brand
Customer Satisfaction
Internal Perspective
"Build the Franchise" (Innovation Processes)
"Increase Custormer Value" (Customer Management Processes)
"Achieve Operational Excellence" (Operational Processes)
"Be a Good Corporate Citizen" (Environmental Processes)
Learning and Growth Perspective
A Motivated and Prepared Workforce
Strategy Competencies
Strategic Technologies
Climate for Action
* Adapted from Kaplan & Norton Figure 3-15 page 96.
Jarrod Goentzel goentz
Source: http://www.maaw.info/ArticleSummaries/ArtSumKaplanNorton2001.htm


The Financial Model
Return on Total Assets
Return on Equity
Enterprise Value Drivers
Overall Financial Performance
"Flow"
10%
12%
-1.2x
14.4%
28%
18%
Revenue Growth
Operating Profit Margin
Total Asset Turn
Growth
Profitability
Asset Utilization
Excess Capacity
Quality, Price & Service
New Products
Sales Revenue
Cost of Sales
Selling, General & Admin. Costs
Fixed Assets
Cost of Capital
Working Capital
Game Decisions, Actions & Events
Supply Chain Levers
Supply Chain Levers
Supply Chain Levers
Cash Conversion %
Raw Materials
Work in Progress
Finished Goods
Days In Inventory
Accounts Payable
Days Sales Outstanding
Accounts Receivable
Days Purchases Outstanding
Expenses
Cash
Financing
Cash Operating Cycle
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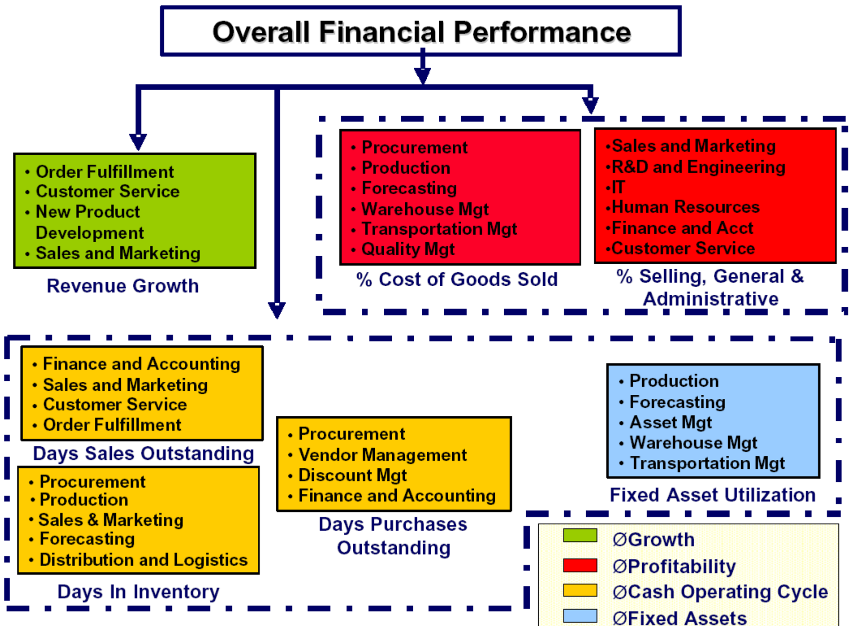
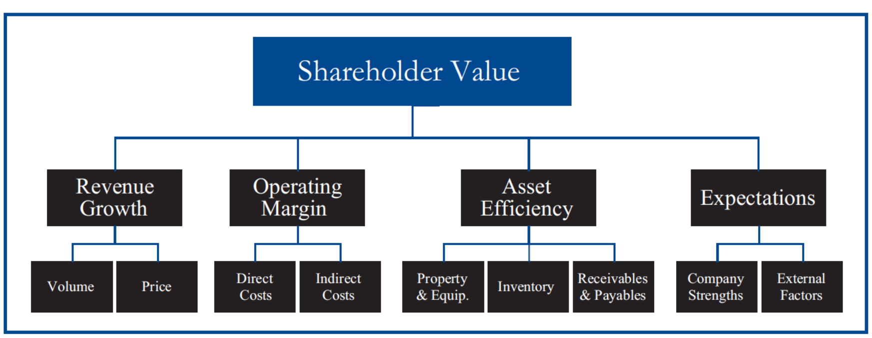
Source: website, Trade Dynamics, LLC



Source: website, Finlistics Solutions

Deloitte Enterprise Value Map

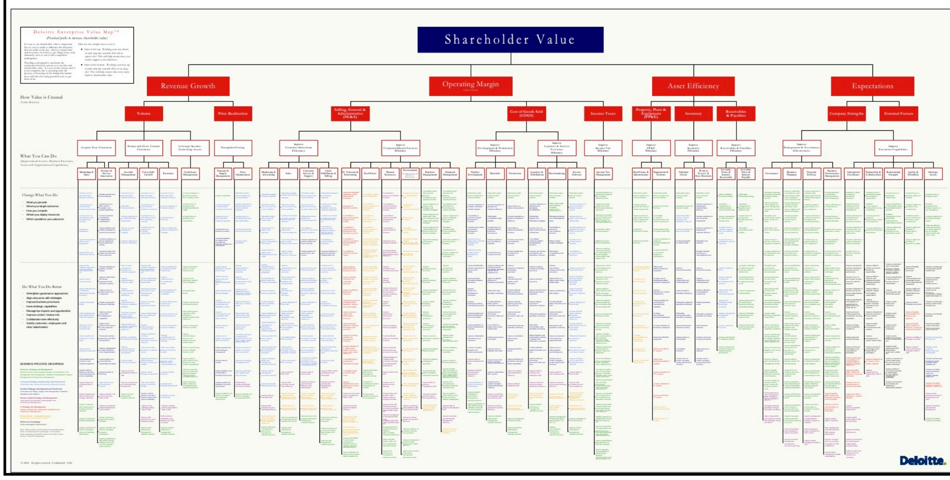
Figure 1 High-level shareholder value map (Deloitte methods)



Source: Lukac, E. G., & Frazier, D. (2012). Linking strategy to value. *Journal of Business Strategy*, *33*(4), 49-57.

Deloitte Enterprise Value Map

Download the full map: http://public.deloitte.com/media/0268/enterprise_value_map_2_0.pdf



Goal of the CEO

- Provide Shareholder Value
- Drivers of Shareholder Value
  - Revenue Growth
  - Operating Margin
  - Asset Productivity

Supply chain professionals can affect all three!

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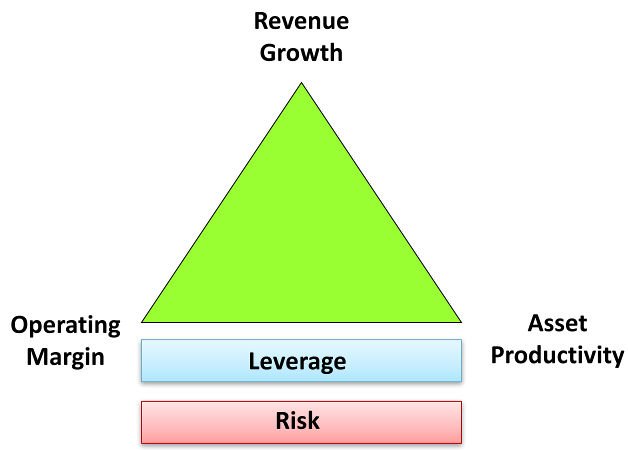
Drivers of shareholder value



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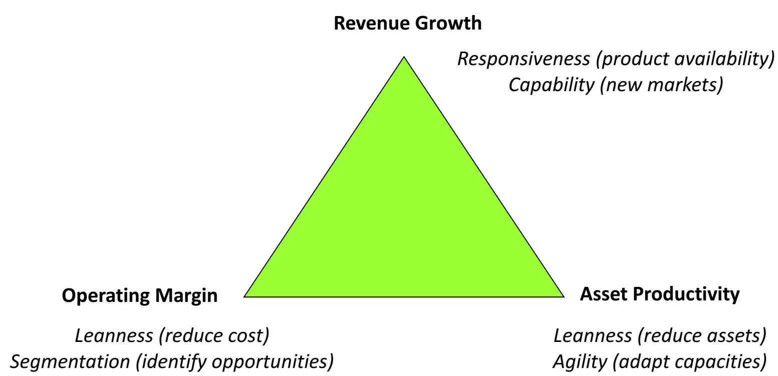
How does supply chain performance make an impact on financial results?



- Tradeoffs exist
- Where do you focus?

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Sunflower Nutraceutical (SNC) analysis

Decisions Phase 1: 2013 - 2015

- Acquire a New Customer
- Leverage Supplier Discount
- Tighten Accounts Receivable
- Drop Poorly Selling Products

SNC is considering an opportunity to add Atlantic Wellness, a large, successful health food chain as a new corporate customer for its herbal nutraceutical product line. Taking on this customer would immediately increase SNC's sales by $4 million per year (a one-time increase of 40%) and EBIT by $260,000. The profit margins and net working capital terms would remain the same as for SNC's existing business.

What would you like to do about this opportunity?

Accept Decline

	2013	2014	2015	Post 2015
Incremental Summary Income Statement ($ in thousands)				
Sales	$4,000	$4,000	$4,000	$4,000
Cost of Sales	$3,740	$3,740	$3,740	$3,740
EBIT	$260	$260	$260	$260
Incremental Balance Sheet ($ in thousands)				
Accounts Receivable	$1,205	$1,205	$1,205	$1,205
Inventories	$922	$922	$922	$922
Accounts Payable	$420	$420	$420	$420

Opportunities Selected

No opportunities selected yet.

Submit Decisions

Sunflower Nutraceutical (SNC) analysis

Decisions Phase 1: 2013 - 2015

- Acquire a New Customer
- Leverage Supplier Discount
- Tighten Accounts Receivable
- Drop Poorly Selling Products

SNC is considering working with Nutrilife on a half-size contract for its herbal nutraceutical product line, with an incremental sales benefit to the top line of $2 million (a one-time 20% increase). In addition, Ayurveda Naturals, the India-based supplier of herbs for the Nutrilife contract, is offering very favorable payment terms: 2/30 net 60. In other words, SNC could lower its accounts payable liability to $153,000 by paying Ayurveda Naturals within 30 days, thereby realizing a 2% discount on raw materials.

What would you like to do about this opportunity?

Accept Decline

	2013	2014	2015	Post 2015
Incremental Summary Income Statement ($ in thousands)				
Sales	$2,000	$2,000	$2,000	$2,000
Cost of Sales	$1,833	$1,833	$1,833	$1,833
EBIT	$167	$167	$167	$167
Incremental Balance Sheet ($ in thousands)				
Accounts Receivable	$603	$603	$603	$603
Inventories	$452	$452	$452	$452
Accounts Payable	$151	$151	$151	$151

Opportunities Selected

No opportunities selected yet.

Submit Decisions

Sunflower Nutraceutical (SNC) analysis

Decisions Phase 1: 2013 - 2015

- Acquire a New Customer
- Leverage Supplier Discount
- Tighten Accounts Receivable
- Drop Poorly Selling Products [No Title]

Opportunities Selected

No opportunities selected yet.

Submit Decisions

SNC is considering evaluating the payment profile of its customer base, especially focusing on customers who are chronically delinquent in paying invoices. Super Sports Centers-a national, mall-based, upscale fitness network and a key SNC customer (accounting for 20% of SNC's overall sales)-routinely takes almost 200 days to pay its invoices. That far exceeds the 90-day average collection period for SNC's other customers. If SNC drops Super Sports Centers from its customer base, sales will decrease by $2 million. However, the cash-flow measure of days sales outstanding (DSO) will quickly improve.

What would you like to do about this opportunity?

Accept Decline

	2013	2014	2015	Post 2015
Incremental Summary Income Statement ($ in thousands)				
Sales	-$2,000	-$2,000	-$2,000	-$2,000
Cost of Sales	-$1,870	-$1,870	-$1,870	-$1,870
EBIT	-$130	-$130	-$130	-$130
Incremental Balance Sheet ($ in thousands)				
Accounts Receivable	-$1,096	-$1,096	-$1,096	-$1,096
Inventories	-$461	-$461	-$461	-$461
Accounts Payable	-$210	-$210	-$210	-$210

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Sunflower Nutraceutical (SNC) analysis

Decisions Phase 1: 2013 - 2015

- Acquire a New Customer
- Leverage Supplier Discount
- Tighten Accounts Receivable
- Drop Poorly Selling Products

Opportunities Selected

No opportunities selected yet.

Submit Decisions

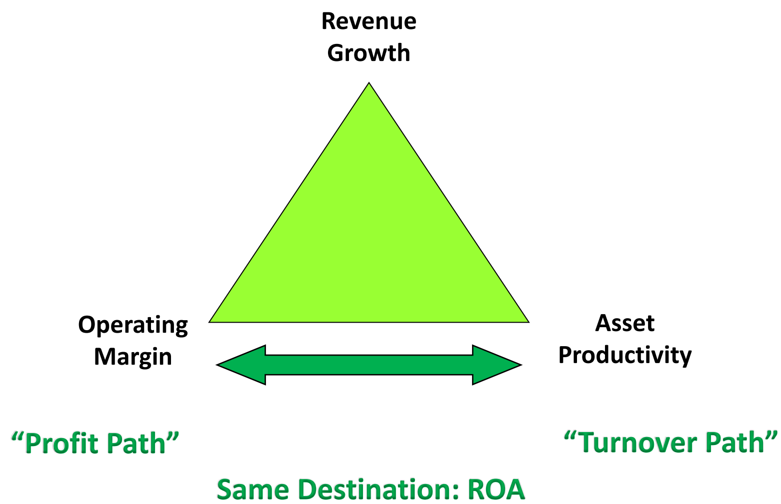
Sunflower Nutraceuticals is planning to review the order frequency of individual products through stock-keeping units (SKUs) over the last 12 months. Although Sunflower carries over 100 different SKUs, certain types of products —such as vitamins for specific life stages, less popular herbs, and other products —are not everyday purchases for most consumers, so those items take up space in the physical inventory but have a low turnover. If Sunflower eliminates these slower-moving items from the inventory, the companys sales will decrease by $1 million and EBIT will decrease by $65,000. Reducing the size of Sunflowers overall product offerings will lower the Days Sales of Inventory (DSI) to a more desirable 86 days. These changes are reflected in the assumptions provided below.

What would you like to do about this opportunity?

Accept Decline

	2013	2014	2015	Post 2015
Incremental Summary Income Statement ($ in thousands)				
Sales	-$1,000	-$1,000	-$1,000	-$1,000
Cost of Sales	-$935	-$935	-$935	-$935
EBIT	-$65	-$65	-$65	-$65
Incremental Balance Sheet ($ in thousands)				
Accounts Receivable	-$301	-$301	-$301	-$301
Inventories	-$323	-$323	-$323	-$323
Accounts Payable	-$105	-$105	-$105	-$105

DuPont assesses the Operating Margin – Asset Productivity tradeoff at a high level



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Do you see any extreme examples of Profit Path and Turnover Path?

	Return on Equity (ROE) (%)	=	Profit Margin (P) (%)	×	Asset Turnover (A) (times)	×	Financial Leverage (T) (times)
Adobe Systems	14.9	=	20.4	×	0.47	×	1.57
Chevron	18.1	=	10.0	×	1.03	×	1.76
Google	18.4	=	29.0	×	0.51	×	1.25
Hewlett-Packard	21.7	=	7.0	×	1.01	×	3.08
JPMorgan Chase	10.3	=	15.0	×	0.054	×	12.58
Norfolk Southern	14.0	=	15.7	×	0.34	×	2.64
Novartis	15.5	=	19.3	×	0.41	×	1.95
Safeway	11.8	=	1.42	×	2.71	×	3.03
Sensient Technoligies	10.9	=	8.1	×	0.83	×	1.63
Southern Company	12.6	=	11.7	×	0.32	×	3.40

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

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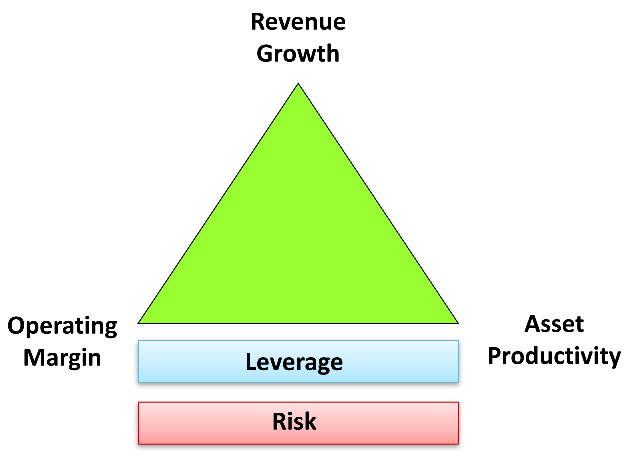
Leverage drives value + increases risk



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Overall measure of financial performance

- ROA = Net Income / Total Assets
- ROE = Net Income / Equity
- Both measures can be distorted by financial leverage, i.e. more debt

	Company D	Company E
EBIT	$280	$280
Interest Expense	$180	$0
EBT	$100	$280
Income Taxes (40%)	$40	$112
Net Income	$60	$168
Total Assets	$2,000	$2,000
Long Term Debt (10%)	$1,800	$0
Total Stockholder's Equity	$200	$2,000
Total Liabilities & Equity	$2,000	$2,000

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ROIC

- ROIC = Return on Invested Capital
  - Returns on all capital for investors seeking a return
  - Not only equity
- ROIC = NOPAT / Invested Capital
- Net Operating Profit After Tax (NOPAT)
  - NOPAT = EBIT (1 - Tax rate)
  - Earnings after tax as if it were all equity financed (i.e., not considering interest expense or tax books)
- Invested Capital
  - IC = Interest-bearing Debt + Equity
  - Sum of all sources of cash on which a return must be earned (i.e., not including accounts payable)
  - You may want to subtract excess cash
  - Prefer the book value of Invested Capital (i.e. the value invested) rather than the market value

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ROIC

- Return on Invested Capital
  a.k.a. RONA (Return on Net Assets)
- ROIC = EBIT(1-Tax rate) / (Interest-bearing debt + Equity)
- Numerator: earnings after tax if it were all equity financed (i.e., not considering interest expense or tax books)
- Denominator: sum of all sources of cash on which a return must be earned

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ROIC is not affected by financing scheme

		Company	
		A	B
Balance Sheet	Debt @ 10% interest	$ 900	$ 0
	Equity	100	1,000
	Total assets	$1,000	$1,000
Income Statement	EBIT	$ 120	$ 120
	– Interest expense	90	0
	Earnings before tax	30	120
	– Tax @ 40%	12	48
	Earnings after tax	$ 18	$ 72
	ROE	18.0%	7.2%
	ROA	1.8%	7.2%
	ROIC	7.2%	7.2%

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011.

ROIC is not affected by financial leverage

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Total Stockholder's Equity	$200	$2,000
Total Liabilities & Equity	$2,000	$2,000

	Company D	Company E
ROE	30.0%	8.4%
ROA	3.0%	8.4%

- ROIC is a good measure for supply chain performance
  - It is not confounded by financing strategies
  - It shows the fundamental earning power of the firm, i.e., created by operations

EVA™

- EVA™ = economic value added
  = NOPAT – (IC * COC)
- where
  - IC = invested capital
  - COC = cost of capital [i.e. WACC]
  - NOPAT = net operating profit after taxes [i.e. EBIT*(1-TaxRate)]
- Transform accounting profit into economic profit
  - Convert accrual-based earnings into a cash-based NOPAT
  - Convert total assets to invested capital
  - Assess the quantity of capital used to generate the income
  - The complexity and effort to adjust GAAP is a weakness of EVA

Note: EVA™ is a trademarked symbol of Stern, Stewart & Co.

Simple bottom line

If economic value added is positive in a given year, the firm has earned more than the amount required to compensate debtholders and shareholders

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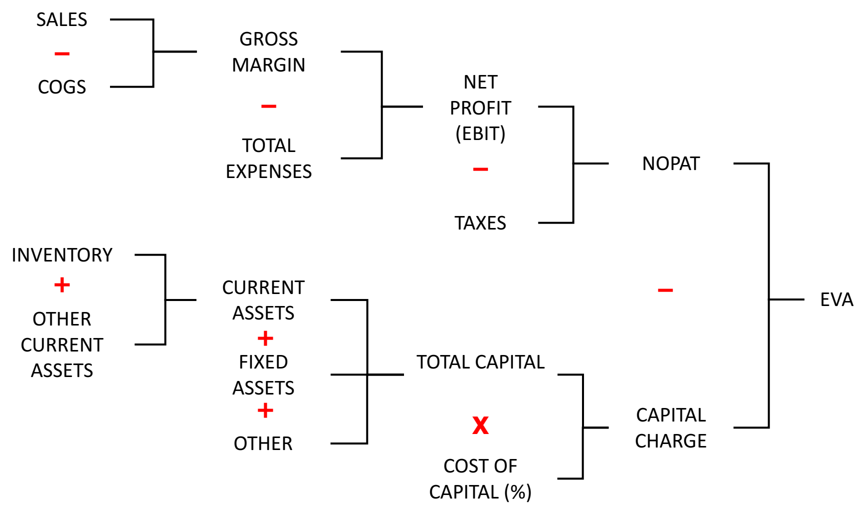
Economic Value Added



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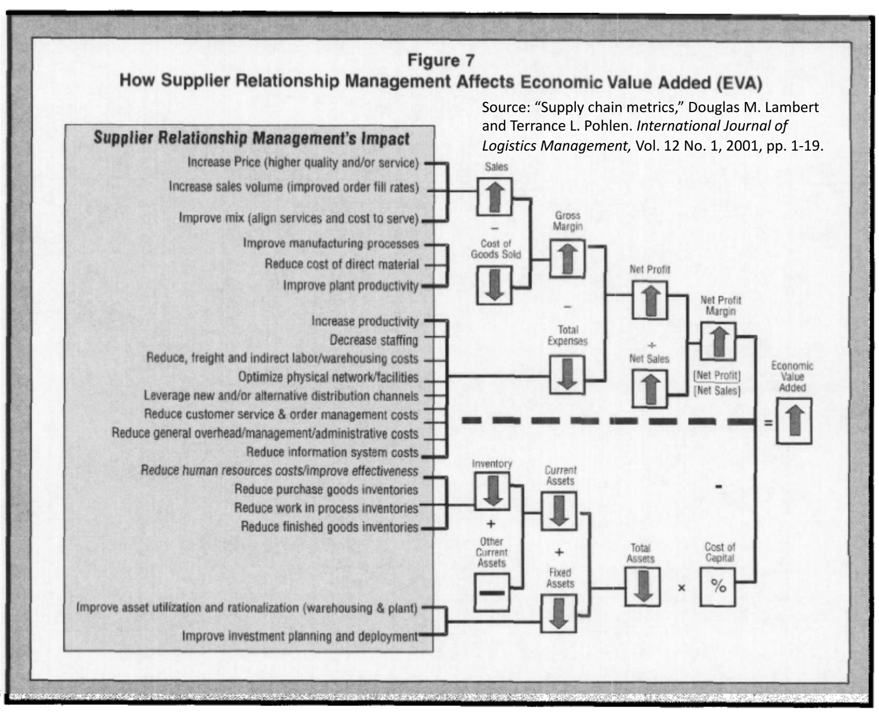
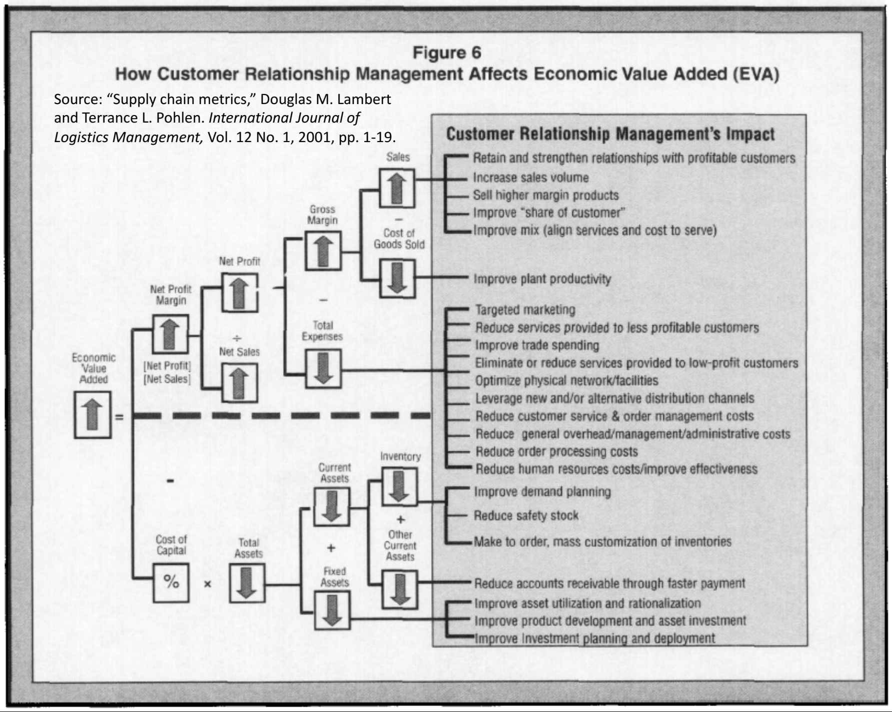


Source: "Supply chain metrics," Douglas M. Lambert and Terrance L. Pohlen. *International Journal of Logistics Management,* Vol. 12 No. 1, 2001, pp. 1-19.



Example: supply chain tradeoff

			Base		New Proposal	
Revenues			$ 100,000		$ 100,000	
Operating Costs		-	$ 85,000		$ 86,500	
SC				$ 10,000		$ 11,500
Non-SC				$ 75,000		$ 75,000
EBIT		=	$ 15,000		$ 13,500	
Taxes	38%	-	$ 5,700		$ 5,130	
NOPAT		=	**$ 9,300**		**$ 8,370**	
Capital			$ 70,000		$ 60,000	
SC				$ 54,000		$ 44,000
Non-SC				$ 16,000		$ 16,000
Cost of Capital	10%					
Capital Charge		-	**$ 7,000**		**$ 6,000**	
SC				$ 5,400		$ 4,400
Non-SC				$ 1,600		$ 1,600
EVA		=	**$ 2,300**		**$ 2,370**	
					103.0%	

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Example: supply chain improvement

			Base		Ops better	10%	Cap better	10%
Revenues			$ 100,000		$ 100,000		$ 100,000	
Operating Costs		-	$ 85,000		$ 84,000		$ 85,000	
SC				$ 10,000		$ 9,000		$ 10,000
Non-SC				$ 75,000		$ 75,000		$ 75,000
EBIT		=	$ 15,000		$ 16,000		$ 15,000	
Taxes	38%	-	$ 5,700		$ 6,080		$ 5,700	
NOPAT		=	**$ 9,300**		**$ 9,920**		**$ 9,300**	
Capital			$ 70,000		$ 70,000		$ 64,600	
SC				$ 54,000		$ 54,000		$ 48,600
Non-SC				$ 16,000		$ 16,000		$ 16,000
Cost of Capital	10%							
Capital Charge		-	**$ 7,000**		**$ 7,000**		**$ 6,460**	
SC				$ 5,400		$ 5,400		$ 4,860
Non-SC				$ 1,600		$ 1,600		$ 1,600
EVA		=	**$ 2,300**		**$ 2,920**		**$ 2,840**	
					127.0%		123.5%	

EVA is aligned with NPV

The present value of EVAs from a given project is mathematically equivalent to the NPV of the project

(a) Standard NPV Analysis

	Year 0	1	2	3	4
Initial investment	−$100.00				
Revenue		$ 80.00	$80.00	$80.00	$80.00
Cash expenses		13.33	13.33	13.33	13.33
Depreciation		25.00	25.00	25.00	25.00
Income before tax		41.67	41.67	41.67	41.67
Tax at 40%		16.67	16.67	16.67	16.67
Income after tax		25.00	25.00	25.00	25.00
Depreciation		25.00	25.00	25.00	25.00
After-tax cash flow	−$100.00	$ 50.00	$50.00	$50.00	$50.00
NPV at 10%	$ 58.50				

(b) Discounted EVA Analysis

	Year 0	1	2	3	4
Capital employed		$100.00	$75.00	$50.00	$25.00
K_W		0.10	0.10	0.10	0.10
$K_W \times$ Capital		10.00	7.50	5.00	2.50
EBIT$(1 - t)$		25.00	25.00	25.00	25.00
$- K_W \times$ Capital		10.00	7.50	5.00	2.50
EVA		$ 15.00	$17.50	$20.00	$22.50
EVA discounted at 10%	$ 58.50				

EVA is not new, so why is it popular?

- Consultants are good at repackaging old ideas
  - Basic idea used by General Motors in 1920s
  - Labeled by General Electric in 1950s as "residual income"
  - Trademarked by Stern Stewart in 1990s as EVA™ (with further new terminology such as NOPAT)
- Uniformity: it can be used for three crucial management functions
  - Investment analysis (instead of NPV, IRR, BCR)
  - Business unit performance appraisal (instead of ROE, ROA)
  - Compensation incentive (turn middle managers into "owners")
- It is more streamlined than relying on a host of measures such as NPV, IRR, BCR, ROE, ROIC, EPS, etc.

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"EVA promises to complete the transformation of value creation from a mere slogan into a powerful management tool, one that may at last move modern finance out of the classroom and into the boardroom – and perhaps even onto the shop floor."

Source: Higgins, R. Analysis for Financial Management. 10th ed. McGraw-Hill Irwin, 2011

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