Chapter 6. Link Between Operations and Finance

ROIC or KPI Tree

- Economic Value Created =

  Invested Capital X (ROIC – WACC)

  where ROIC= Return on Invested Capital

  WACC = Weighted Average Cost of Capital

ROIC or KPI (Key Performance Indicators) Tree

⇒ Read financial statements to get a sense of the operational performance of a company

ROIC or KPI Tree

$$\text{ROIC} = \frac{\text{Net Operating Profit after Tax (NOPAT)}}{\text{Average Invested Capital}}$$

Apple (2019)

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NOPAT [ 49.682 B ]
(/) Average Invested Capital over Period [ 199.7 B ]
(=) Return On Invested Capital [ 24.9% ]


Where invested capital is calculated as follows:

(+) Average Debt = (108.4 B + 122.2 B) / 2 = 115.3 B
(+) Average Equity = (96.456 B + 72.282 B) / 2 = 84.369 B
(=) Invested Capital [ 199.7 B ]
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Apple Return on Invested Capital Benchmarks

Name	Ticker	Return on Invested Capital
Western Digital Corporation	NASDAQGS:WDC	1.4%
Information Technology	SECTOR:IT.US	2.8%
Tesla, Inc.	NASDAQGS:TSLA	3.7%
Hewlett Packard Enterprise Co...	NYSE:HPE	4.6%
International Business Machines...	NYSE:IBM	7.1%
Amazon.com, Inc.	NASDAQGS:AMZN	8.5%
Alphabet Inc.	NASDAQGS:GOOG.L	11.5%
Netflix, Inc.	NASDAQGS:NFLX	11.9%
Microsoft Corporation	NASDAQGS:MSFT	20.1%
Avid Technology, Inc.	NASDAQGS:AVID	23.9%
Apple Inc.	NASDAQGS:AAPL	24.9%
HP Inc.	NYSE:HPQ	64.7%

PAUL DOWNS CABINETMAKERS

Paul Downs started making furniture in 1986, in a small shop in Manayunk. Over the years we have outgrown 4 other shops and we now operate a 33,000ft^2 shop in Bridgeport, PA.

Much of our work is residential, but we also do a lot of office furniture, including desks and conference tables. We complete 125 commissions per year, consisting of about 500 separate pieces of furniture.

PAUL DOWNS
CABINETMAKERS

Production facility

Machines valued about $450k, depreciation $80k per year
Overall facility is utilized at 100% right now

Show rooms and factory: $150k for rent

Indirect costs: (marketing $100k, $180k management, $60k finish)

Inventory: $50,000 WIP and $20,000 raw material
Suppliers need to be paid 1 month before receiving the wood.

PAUL DOWNS
CABINETMAKERS

Work force

12 cabinet makers each working about (220 days @8h/day)

wage rate: $20 per hour

A worker needs about 40h per unit of furniture (work-cell) as labor content

Spend about 15% of time on set-ups (build fixtures / program machines)

Labor utilization around 90% (idle time resulting from waiting)

PAUL DOWNS
CABINETMAKERS

End Product

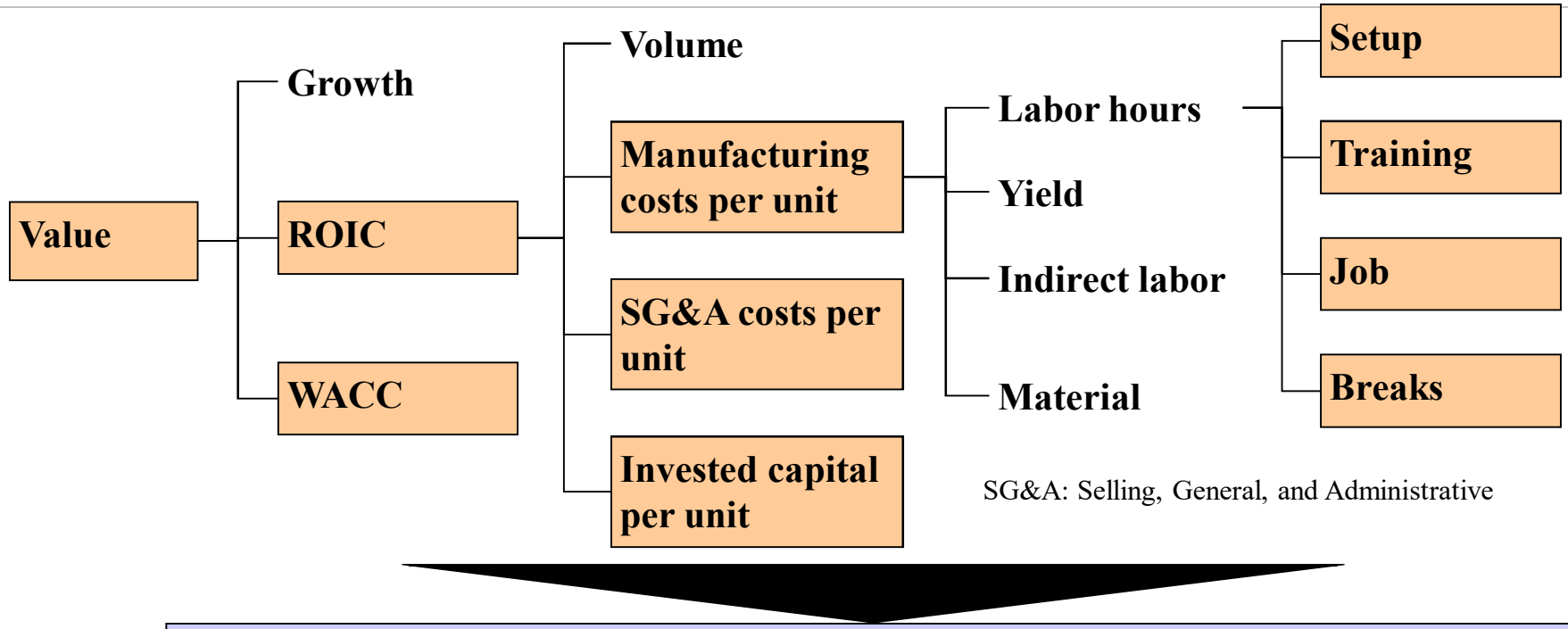
Average price is $3000 per unit

Requires 30kg of wood (wood costs about $10 per kg) before scrap

25% scrap

Customer pays 50% as a down payment and gets her furniture 3 months later

Creating ROIC (Value, KPI) Trees



SG&A: Selling, General, and Administrative

Develop value trees

- Link financial measures to potential value drivers in operations
- In operations, **performance typically focuses on ROIC**
- Develop several versions as there is no "right answer"
- Explore multiple sub-trees

Value Drivers

Value drivers are operational variables in the ROIC tree that have a big impact on ROIC

Identify value drivers based on sensitivity analysis in Excel

Typical value drivers:

-If operation is currently capacity constrained (i.e. has high demand),

everything that creates additional capacity is powerful

- utilization / downtime
- production yields
- set-up time / other improvement of overall equipment effectiveness (OEE)

-If operation is currently demand constrained (i.e. has insufficient demand),

everything that gets more $'s out of a customer is powerful

- variety / customization
- after-sales service / support ⇒ innovation

But: no general rule exists: your insight is needed

How the Airline Industry Works: Philadelphia (PHL) to Seattle (SEA) on a Boeing 737-700

Distance: 2378 miles (nonstop)

Seats on airplane: 137

Available seat miles (ASM): 137*2378=325,786 seat miles

120 passengers are on the plane paying an average of $200 for their ticket

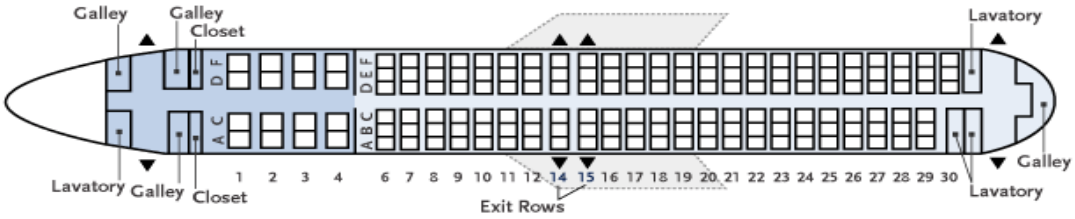
Revenue passenger miles (RPM): 120*2378=285,360 revenue passenger miles

Load factor: RPM/ASM=0.876 (percentage of seats sold)

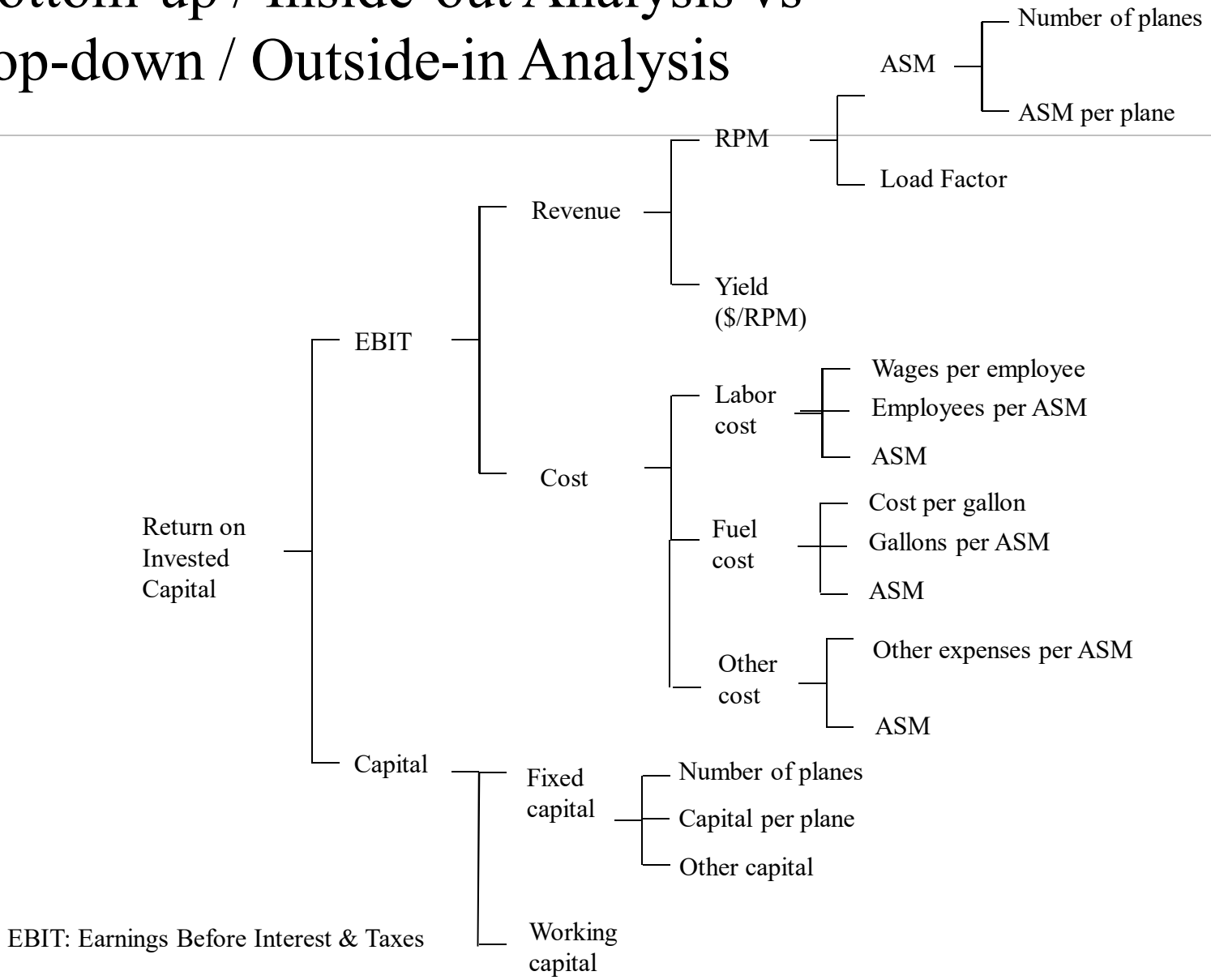
Yield: revenue per revenue passenger mile=120*200/285,360=200/2378=0.08 $/RPM

Main cost categories are

- Labor expenses
- Fuel expenses
- Landing fees



Bottom-up / Inside-out Analysis vs Top-down / Outside-in Analysis



EBIT: Earnings Before Interest & Taxes

Using Productivity Ratios: Airline Application

Revenue/Cost=Revenue/Output * Output/Capacity * Capacity/Cost

Operational yield | Transformation efficiency | 1/unit cost of capacity

Revenue / labor costs = Revenue/RPM * RPM/ASM * ASM / Employee * Employees/Labor costs

USAir: 2.43 = 0.197 * 0.70 * 0.37 * 47.35
SW : 3.31 = 0.135 * 0.69 * 0.53 * 67.01

⇨ *Labor productivity advantage of SW is driven by (a) fewer employees per ASM and (b) lower wages*

Note: There exists a $25k per year difference in wages (=($1million/47.35-$1million/67.01)*4 quarters)

Revenue / fuel costs = Revenue/RPM * RPM/ASM * ASM/Gallons * Gallons/fuel costs

USAir: 6.21 = 0.197 * 0.70 * 52.3 * 0.86
SW : 6.79 = 0.135 * 0.69 * 60.2 * 1.21

⇨ *Fuel productivity advantage of SW is driven by (a) fewer gallons per ASM (by fuel efficient aircrafts) and (b) cheaper fuel (by hedging)*

Note: There exists a $0.33 per gallon difference in fuel prices (=(1/0.86 – 1/1.21))

Using Productivity Ratios: Airline Application

Table 6.2 Comparison between Southwest and other airlines

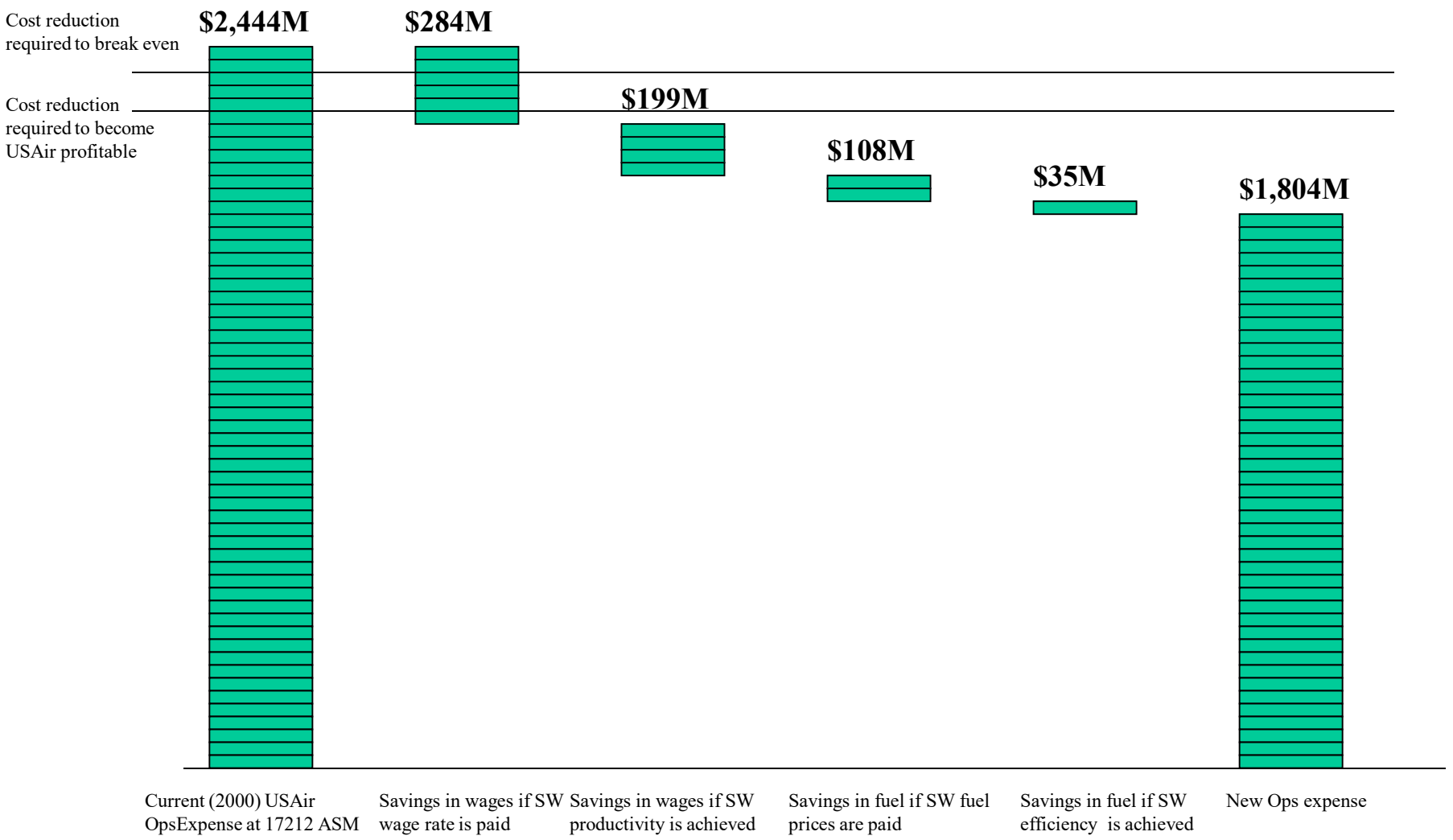
Airline	Operational Yield [$/RPM]	Load Factor [%]	ASM per Employee	Number of Employees/Million US$ of Labor Costs	Overall Labor Productivity
Delta	0.14	0.85	2682.7	7.42	2419.2
South-west	0.15	0.84	2912.7	7.15	2606.0
United	0.14	0.83	2529.5	8.32	2364.7

2016 MIT Airline data

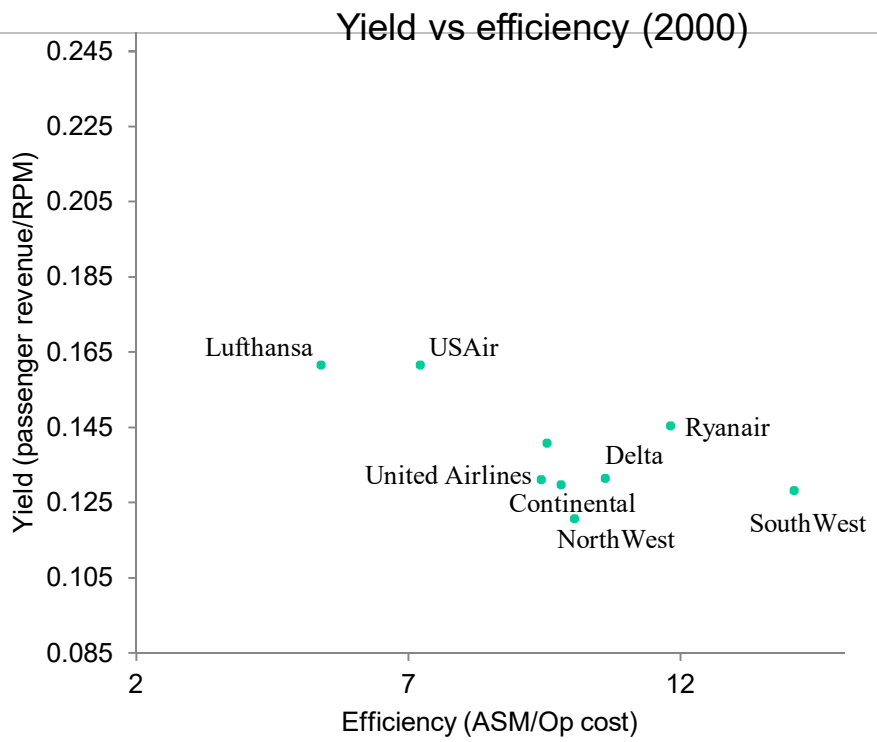
- A Southwest employee is able to support almost 10% more ASM compared to Delta and United employees. (This gap was more than 30% 5 years ago!)

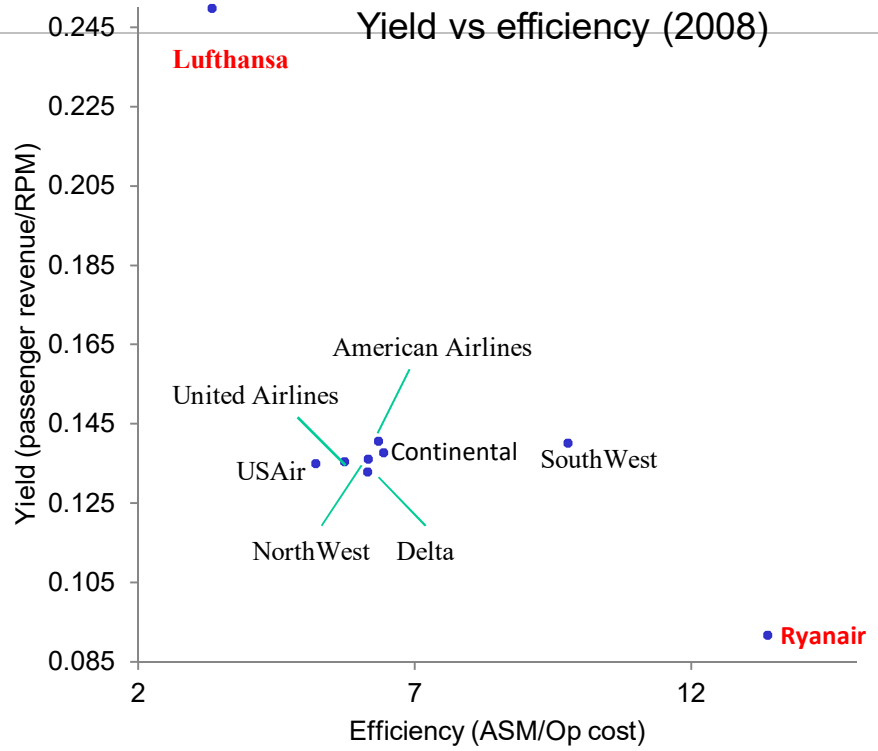
- Southwest employees earn higher wages.

Sizing the Pie: How to Value the Financial Performance Improvement From an Improved Productivity Ratio



Strategic Trade-offs





- No differentiation between the major US carriers
- Efficient frontier:
  Southwest introduced the high efficiency strategy in the US
  Ryanair has pushed this to the extreme in Europe following

⇒ Choose clean strategies, especially for Lufthansa and Ryanair …
… and drive improvement towards the frontier and beyond

Note: all numbers are exchange rate adjusted