airlines ↔ can be profitable -if costs below profitable

Five Reasons Why The Airline Industry Will Never Be Profitable

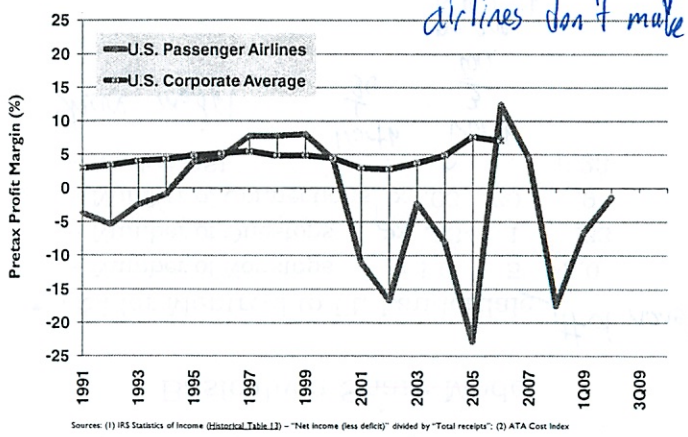
Montie Brewer
President and CEO (Retired)
Air Canada
2004-2009
November 3, 2010

need to solve for these issues

Airline Industry Profitability Elusive

Pretax Profit Margin Highly Cyclical and Well Below U.S. Corporate Average

airlines don't make $

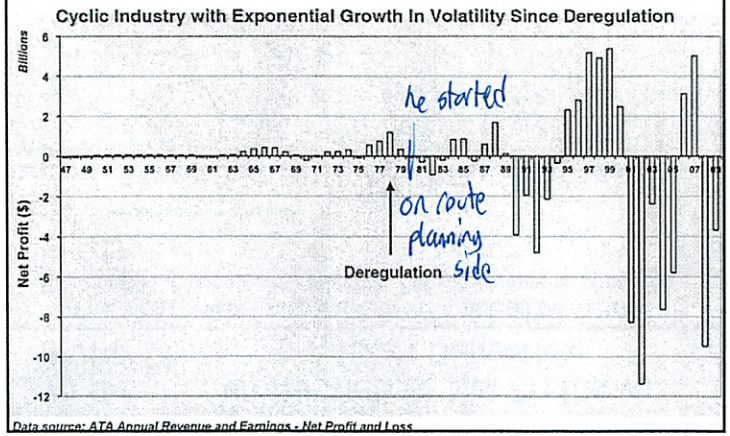


Sources: (1) IRS Statistics of Income (Historical Table 13) – "Net income (less deficit)" divided by "Total receipts"; (2) ATA Cost Index

www.airlines.org

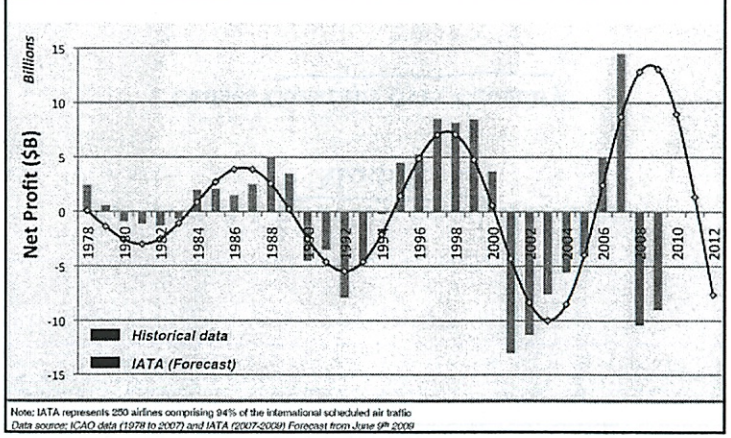
did a lot of innovation during that time ← everyone he worked for went bankrupt
worked at a lot of airlines before that

Macro Scale Drivers US Airline Net Profit



Data source: ATA Annual Revenue and Earnings - Net Profit and Loss

World Airlines Net Profit (from 1978 to 2009)



Note: IATA represents 250 airlines comprising 94% of the international scheduled air traffic
Data source: ICAO data (1978 to 2007) and IATA (2007-2009) Forecast from June 9th 2009

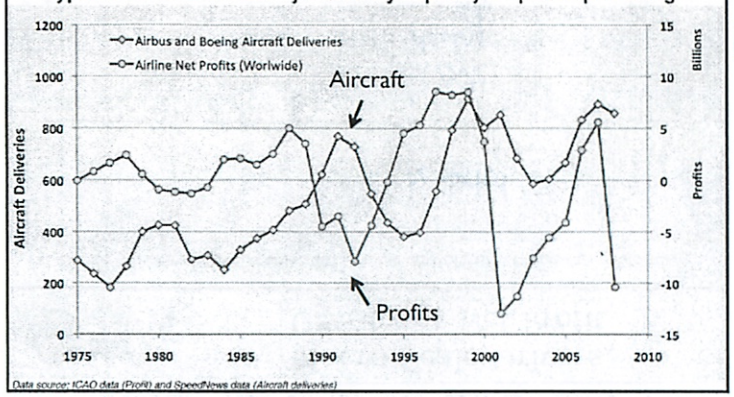
more losses than profits

overall has not been profitable

its raw supply + demand

World Airlines Net Profits vs. Aircraft Deliveries

Phase Lag between Airline Net Profits & Aircraft Deliveries: Hypothesize that instability driven by capacity response phase lag



capacity driven problem

aircraft orders 3-4 years before arrival

#1 It's A Capacity Lead Business Model

Causes Constant Over Capacity

QSI Market Forecasting Model

- Quality of Service Index
  - Values a service relative to other service offerings
  - Allows forecasters to determine potential of new markets and services
- Developed in the 1960s
- Very accurate

forecast new route's demand

from Boing

What each stop does to turn off demand within 2-3% of getting it right

demand is good - does not change much

Basically a Share Model

- QSI for Montreal to Ft. Lauderdale

– Number of Nonstops	x 1.0	5	5.0
– Number of Onestops	x .33	1	.33
– Number of Connections	x .03	30	.9
– Market QSI			6.23

#of nonstops in the market

Share model

worth $\frac{1}{30}$

worth $\frac{3}{100}$

no one will do it if can make a stop

Assumes people are pricing the same

Forecasting A New Service

- Montreal – Fort Lauderdale QSI 6.23
- New nonstop QSI 1.0
- New Montreal – Fort Lauderdale QSI 7.23

Demand For The New Service

Note: Demand for air travel historically grew at the same rate as GDP.

New Service YUL-FLL QSI: $\frac{1}{7.23} = .138 \times \underbrace{250}_{\text{Passengers Per Day}} = \underbrace{34.6}_{\text{Market Demand}}$ new pax on new service

all the connections usually add to 1
must consider them

Carriers Always Get Their Share

you always get your share

- Frustrates many a marketing department
  - Steak and eggs
  - More legroom in coach
  - Food
  - Widebody aircraft

  does not matter
- Why carriers focus on price not product

to do a bit better than share
but then others match, so only temp

Impact On Current Services

Market share before $\frac{1}{6.23}$ ⇒ 5.5 Less Passengers per day

Market share after $\frac{1}{7.23}$ (after flights by standing still)

industry demand must grow at same rate as capacity – but forced to match!

Consensitive Capacity does not matter

he started as a travel agent at Crimson Travel

Standing Still Not An Option

- If others add, and you don't, you lose revenue
- Can't grow revenue without adding capacity first
- Doesn't matter how good a product one has, one always gets your share

cost before share

This Simple Display Is To Blame

```
1 Sabre
112NOVCLEMCO7A«
 12NOV  TUE    CLE/EST      MCO/EST I0
1CO     1071 A9 D9 CLEMCO 9   930A 1152A 738 S/S/S/ 0 DCA /E
             F9 E3 Y9 H9 K9 B9 V9 Q9 T9
2CM/CO 2493 C9 D9 CLEMCO     945A 1202P 738 S 0 DCA
             Z4 Y9 H9 K9 B9 V9
3CO     1571 A8 D6 CLEMCO 9 1245P  305P 733 L/L/L/S 0 XJ DCA /E
             F5 E0 Y9 H9 K9 B9 V9 Q9 T9
4YX/**  2183 Y7 B7 CLEMKE     710A  730A FRJ S 0 XS DC /E
             H7 V7 Q7 K7 W7 M7 T7 L7 X7
5YX       90 Y7 B7     MCO     840A 1220P M80 B 0 XS DC /E
             H7 V7 Q7 K1 W1 M0 T0 L0 X0
```

Cleveland to Orlando Service and Fare Display For All Participating Carriers

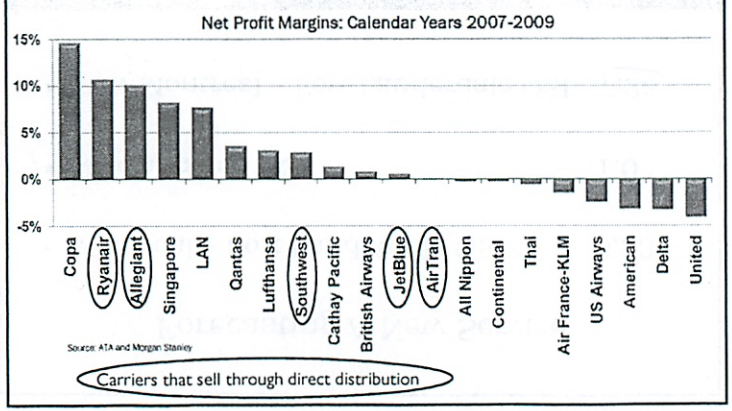
More service leads to more display space

Commody market Seats Shown

biggest impact; 1st screen of GDS - top 2 lines Could beat QSI

- ~~they~~ Sorted by time
- Starts at 7AM

The Losers Club



Airlines are managing demand to capacity, not capacity to demand

demand led model

and they both use same data so throw too much capacity

- Only time industry grows is when econ grows

these on avg more profitable

their demand comes to them

demand based on what people book or ~~look~~ what people search for

#2 Airplanes Don't Go Away

They Just Become More Efficient

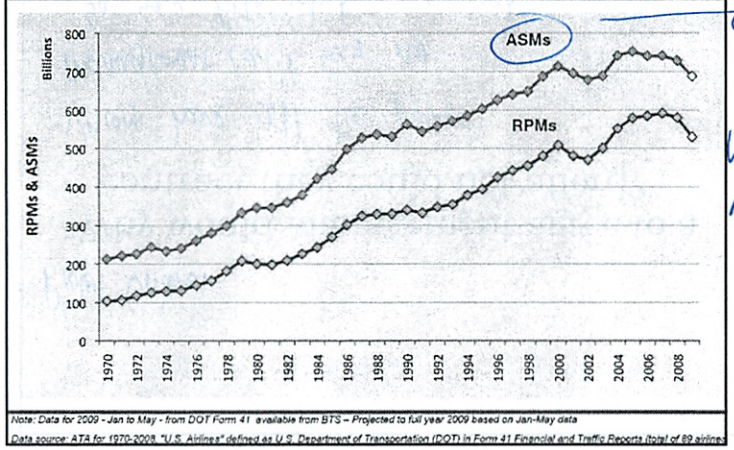
stick around for 40 years
nothing is obsilete
if you sell it off, they come back to haunt you
40 year airplanes - can pay for self for 1.5 years/revenue

#3 Labour Leverage

Political Organization Can't Manage Economic Reality

-can't manage the long-term responsibility

U.S. Domestic ASMs and RPMs



only went up

when get airplane - need to fly it

leasing makes a bunch of $

Politically, Short Term Trumps Long Term

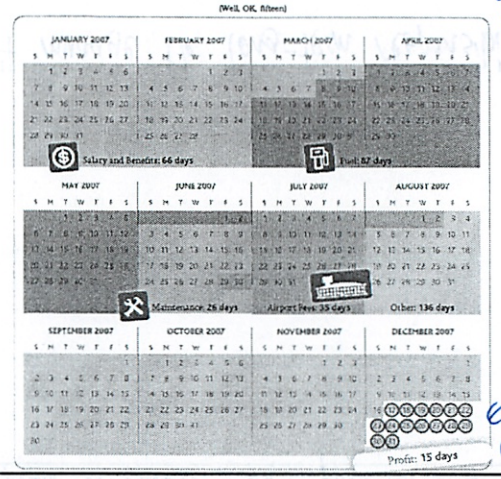
- Timing of settlements
- Deciding how much is enough

& they take lots of training
- can't have replacement

thin margin business

Twelve Days Of Christmas

(Well, OK, fifteen)

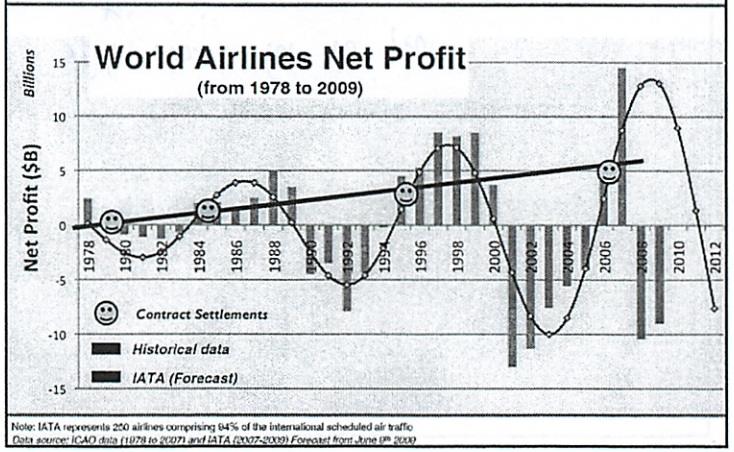


one of their best years

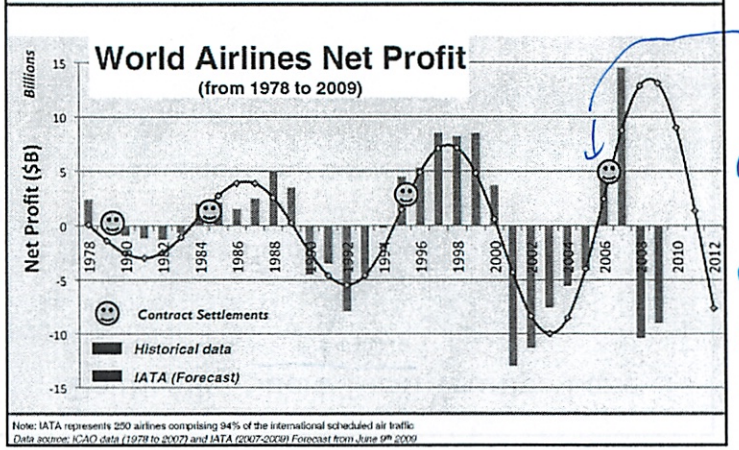
not many days to take a strike for

Strikes bad for service business

It Takes Two To Tango



It Takes Two To Tango



when unions negotiate

Creeping strangulation of cost d'istrictive reset

What legacy carriers are doing

Pilot Unions:

"Why would Management agree to a contract they could not afford?"

Unions have all the power
management can't say no
so say take what you want

Union leaders need to proove that they got most out of management

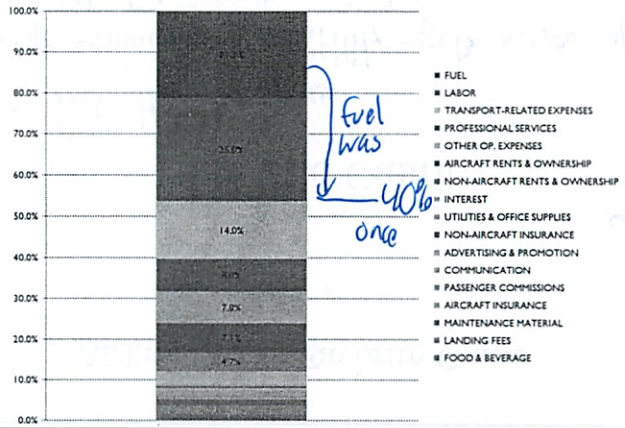
Unions ~~Lost~~ leaders can't say they have full control
leader can be recalled at any time
politically when make a stand → leader is out
they think management has power - so both pretend other side has no power

labor diff around world; only improvement is that fenese around - like arbitration to show that both sides don't have power

#4 Input Costs Are Too Volatile

Revenue Cycle and Cost Cycle Out of Sync

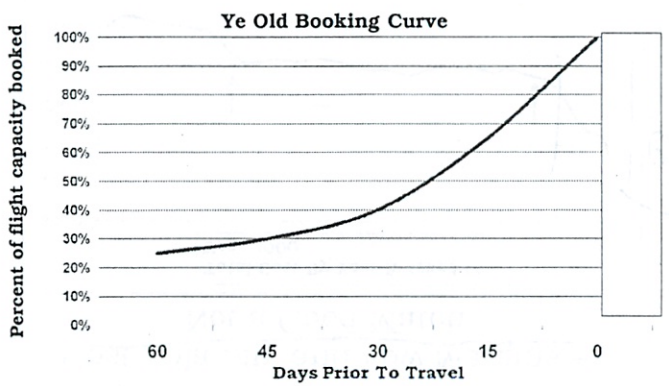
Cost Breakdown By Category



fuel was 40% once

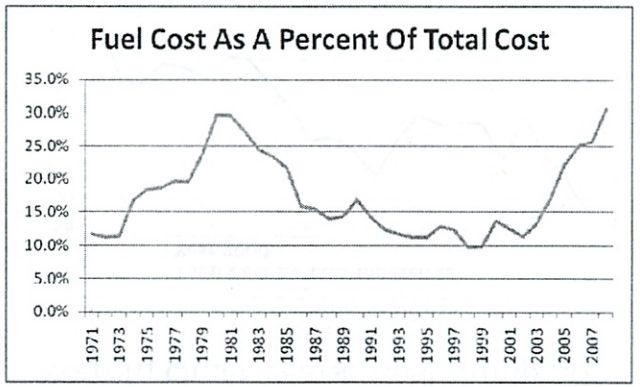
As become more efficient controllable costs decrease

Book Revenue Now, Buy Fuel Later



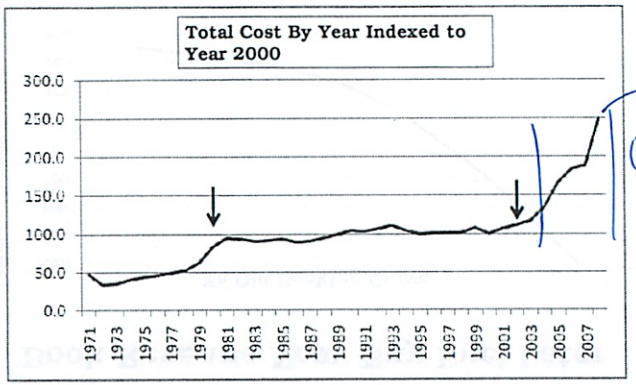
50% of revenue locked in when fares go up - make it up when fuel goes back down

Fuel Volatility Very Difficult To Manage



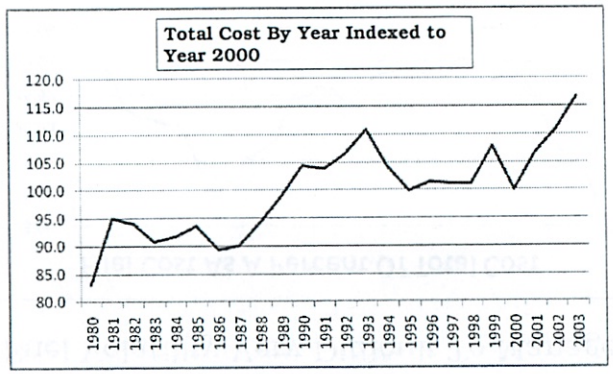
more times revenue + cost out of sync need to figure out to bridge the loss need a lot of cash

Cost Volatility and Low Margins – Not a Good Match



Extream change in cost

Even In Quiet Years, Cost Jump 20 Points

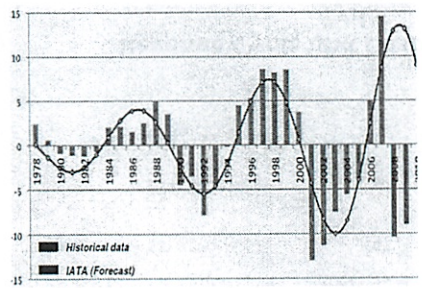


You know revenue a year ahead of time within 1% - but don't know cost

Volitility is driven by commodity flows

but need a lot of cash - 30% revenue - how do you hide it

Not Impossible To Manage – Just Unlikely



Need large cash reserves to manage volatility

Airline CEO's Favorite Game

Hide The Cash!

to live through spikes
hedge - minimize volitility - gets on you slowly
└ bet, luck, can't replicate
When prices go down need to put $ in hedging
union leader needs to stay (ignore $3 billion in cash
or Wall Street will take it ~~buy co~~ if market cap < cash,
Wall St. will buy it and harvest cash
Lufthansa hides cash by owning airplane

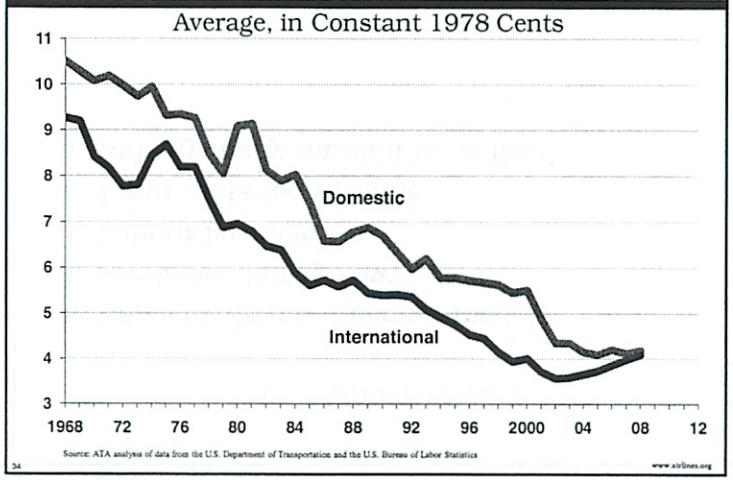
#5 Nobody Really Wants It To Be Fixed

Value Chain, Customers and Governments Benefit From The Way It Is

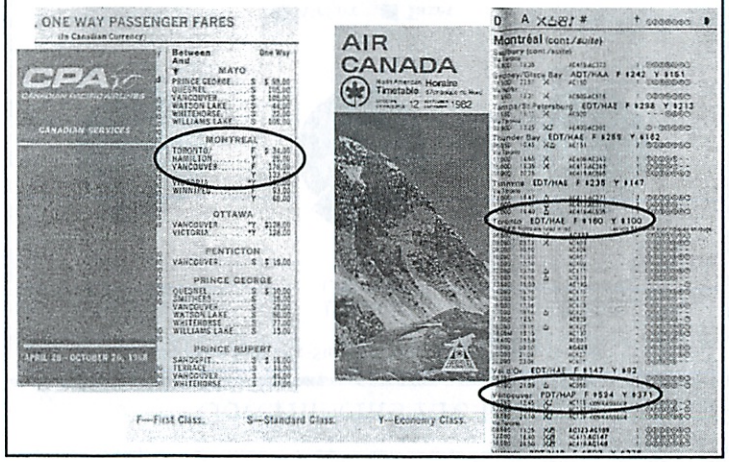
No one cares except airline, employees + shareholders

no one contests – but no one wants to do anything

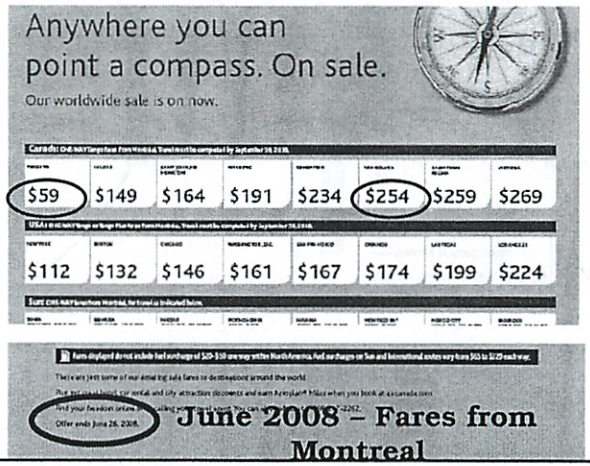
Inflation-Adjusted Price to Fly One Mile on U.S. Airlines



One Way Fares from Montreal in 1968 and 1982



Consumers Are Happy

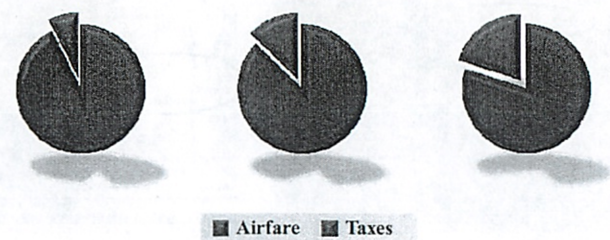


*in no one's interest to change

Governments Are Happy

Tax Bite on a $300 One-Stop Round Trip* Has Nearly Tripled

1972 Taxes	1992 Taxes	2009 Taxes
7% ($22)*	13% ($38)*	20% ($60)*



* Sample itinerary assumes one-stop domestic round trip with maximum passenger facility charge (PFC) per airport; $300 total price includes taxes and fees.
Source: ATA analysis of federal tax code

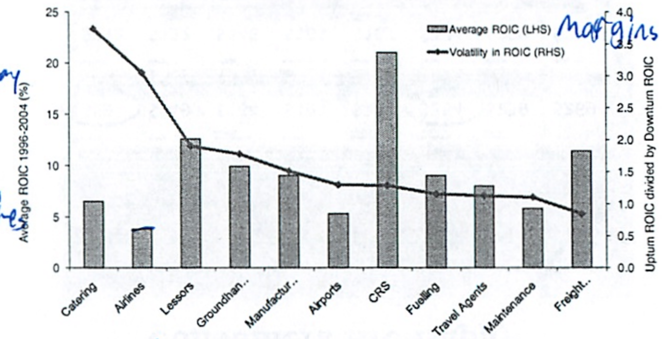
37 www.airlines.org

Same rate of liquor + cigeretts

gov does not care if airline goes away – airplanes are there – new airlines buy them and fares ↓ volume ↑

gov collects a lot of $ from transport ↳ goes to general fund

Best Way To Make Money – Service The Airline Industry



margins

they make a lot of $ in servicing airlines

Summary

- A capacity lead model fostering commoditization
- Capacity never leaves
- Labour has leverage, but cannot manage its responsibility
- Input costs are volatile and would require a level of cash that is difficult to maintain
- Value chain does not want to see things fixed

LCCs – innovating lower-cost

So NLC need to change biz model

Unbundeling = differentiating

GDS = force

Commodity – owned by Hedge funds milking it to it dies

Five Opportunities

1. Capacity driven business model
2. Airplanes don't go away
3. Labour leverage
4. Input costs too variable
5. Nobody really wants it to be fixed

can't an industry if can't reinvest – undercapitalized

– manufactuers – GE = patron saint of failing airlines ↳ the loan shark

Air Canada CEO More

Was Air Canada dominant?

Customers liked it direct

Carriers in US could break the GDS system
- risky stare downs
- cost wants the products
- one could do it

Kayak displays the attributes
GDS can't handle that
they need to show base fare + show other
help airlines decomodize
Show all products to help show it

It can be profitable if you can fix it

Industry addictive
may be dull, but not boring

New tech could blow away industry

Slow + painful process to fix

Aviation law folks will be busy

Q+A

Q: Few markets left to enter. Where?
Need dramatically new efficiency
On board on alliegent → buy old aircraft (pay off in a year)
Most places over served
go small places to leasure
can be available - only fly it booking

(2)

direct dist + unbundling

$65 fares + $35 hotel fees

arbitraging airports

- 5% of Canada market by small airports near border

Q: So old better?

If small markets

Traditional LCCs do new and fly it a lot

- need market that supports

Q: Why unprofitable

Lots of servicing

Less + less airlines in market

Q: Why do people invest?

all hedge funds

live off volitility

can make a killing in a month

no interest in long term

don't want stability

all try to chat each other up to play other side of position

? hedge funds

Q: Cargo in pax airplane

- not really in cargo game
- must be meaningful to shipper
- need dedicated cargo operations

(3)

Q: How to buy cheap airlines
when industry is down
Going to start again - need to grow soon

Q: Freq. flyer programs. Should new entrant:
Only for monitizing loyalty
Still S-curve
If have loyal cust -> do it, perhaps less people
Exponential
Volume discount basically

Q: Emission trading
- Scheme of tax
- to force capicity ↓
- and invest in new tech
- fares ↑
- or new normal

Q: Unbundeling ?
- Pax hate it says media
- US guys have abused it
- they did it to get to lowest fare
matches westJet's low amienties
- costs could buy back up
- US kept fares at level and then forced costs to buy up
- Suprise by GDS

Assignment 3 Due Nov 17

The Southwest Airlines Way:
Using the Power of Relationships to Achieve High Performance

Jody Hoffer Gittell
Brandeis University
MIT Global Airline Industry Program/MIT Leadership Center

The Airline Industry Course
November 8, 2010

Human Resource Management in Airlines

The Airline Industry, 16.71J
Massachusetts Institute of Technology
November 8, 2010

Jody Hoffer Gittell
Brandeis University
MIT Global Airline Industry Program/MIT Leadership Center

Peter Bebbaba helped her get regression analysis to remove other effects

Today's agenda

- Strategic human resource management
- Strategic HRM in the airline industry
  - the SWA approach
  - the JetBlue approach

-somewhat similar, somewhat diff

Strategic human resource management

- Employees are a key driver of organizational performance
- Not just high level employees, but also employees at the front-line of production or service delivery
- How employees are managed can therefore make the difference between organizational success or failure

traditional: paper pushing legal compliance

Goals of strategic HRM

- Adopting HR practices that increase employees' ability to create value
- Internal fit: Understanding how these HR practices fit with each other
- External fit: Understanding how these HR practices fit with the *nature of the work*, and with the organization's *competitive strategy*

along w/ other strategic considerations

hire for teamwork + reward for teamwork

manage knowledge

High performance work systems

- HPWS are sets of HR practices that work *together* to increase employees' ability to create value
- Practices include selection, training, mentoring, rewards, knowledge-sharing mechanisms, etc.
- Most effective when HR practices are implemented in bundles to achieve internal fit or consistency

Nature of the work in airlines

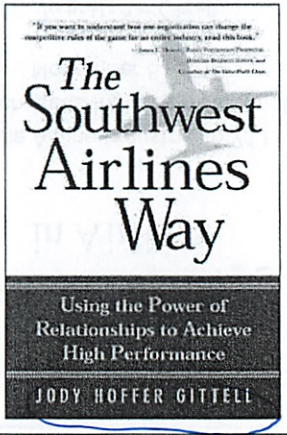
- Airline operations are
  - Highly interdependent → tightly coupled
  - Uncertain → heather
  - Time-constrained → on time performance important
- Coordination is therefore expected to matter for airline performance, regardless of competitive strategy
- What are the implications for human resource management?

but ↓ turnaround time makes things tighter

key competence

time on ground larger in short haul

Consider the case of Southwest Airlines, known for its approach to human resource management



her book

Emergence of Southwest Airlines

Operating since the early 1970s, but largely invisible to the industry for the first 20 years

Consumers, especially corporate buyers, became more price-sensitive in early 90's

Consumers began to redefine quality more in terms of reliability than amenities

Southwest gained national attention in early 90's by winning California intrastate markets from other majors

During Gulf War crisis, Southwest continued to expand while other airlines shrank

Corp buyers more price sensitive

Steady

~~Corp~~ leisure flyers not big on perks

"The Southwest Effect" changed the rules of the game

"Southwest is having a profound effect on the airline industry. Southwest's much lower operating costs are making it the dominant airline today in the sense that Southwest, more than any other airline, is causing the industry to change. Other airlines cannot compete with Southwest in the same manner as they do each other."

(US Department of Transportation Report, 1995)

Continued growth

- Has grown at steady rate of 10-15% per year for most of its history
- Growth slowed after Sept. 11th, while other U.S. airlines shrank, and some entered bankruptcy
- Largest carrier in the U.S. market until surpassed by recent mergers
- Acquisition of AirTran likely to solidify position, expand presence in key markets

While other airlines struggle to achieve 3 or 4 consecutive years of profitability, Southwest has been profitable for each of its 38 years except the first.

Southwest has been called "the most successful airline in history" (Fortune, 2001)

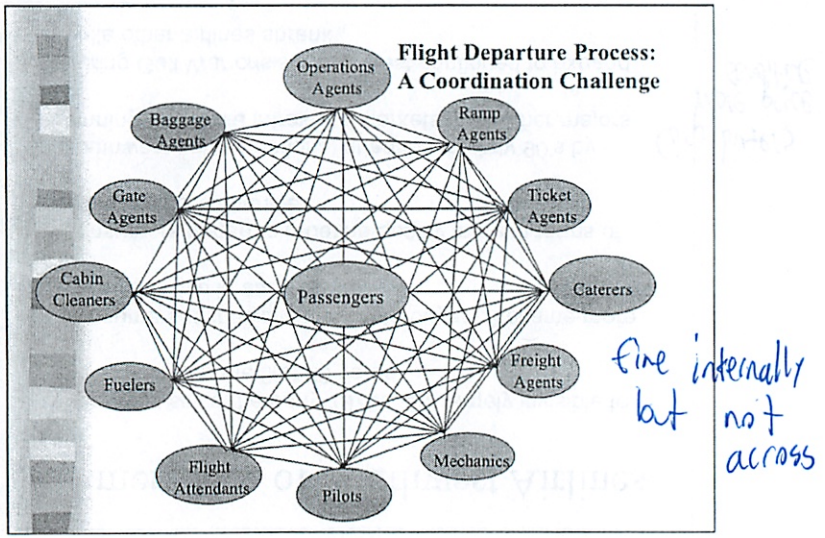
Consistant

BUT
despite increasing efforts to copy, the Southwest model has not often been adopted with success in the airline industry or beyond

Usual reasons given for its success are just plain wrong -- or incomplete

Usual reasons given for success

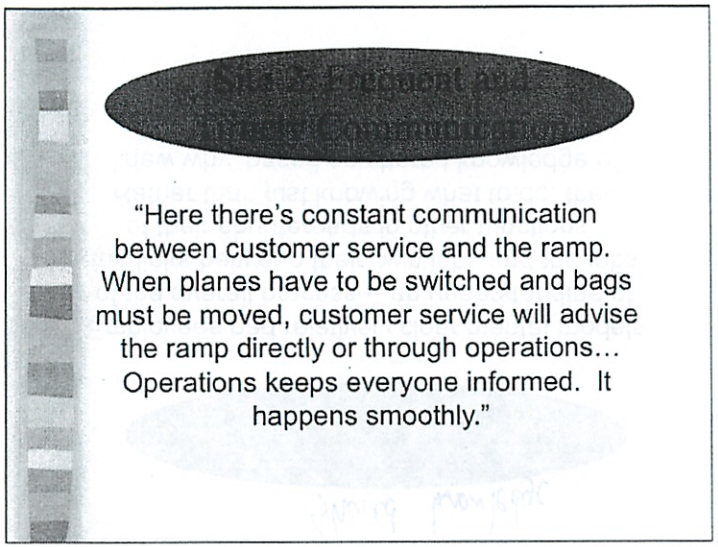
- Wrong
  - No traditional unions
  - Short haul flights
  - Point to point route network
- Right but Incomplete
  - Leadership
  - Culture
  - Teamwork

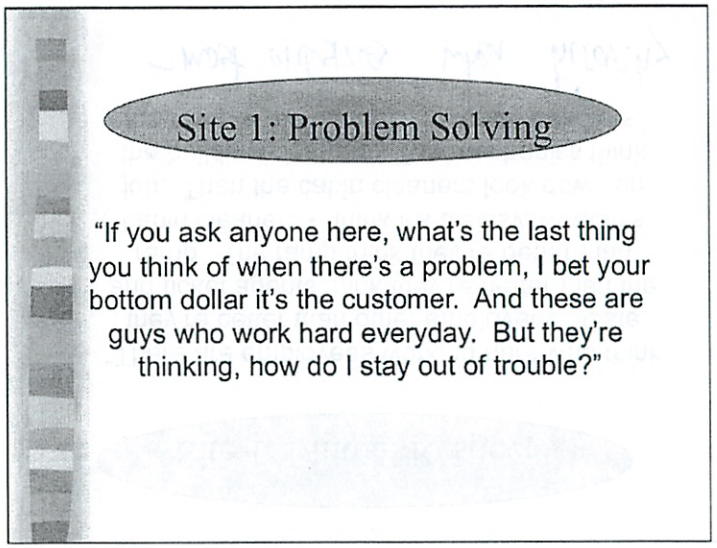


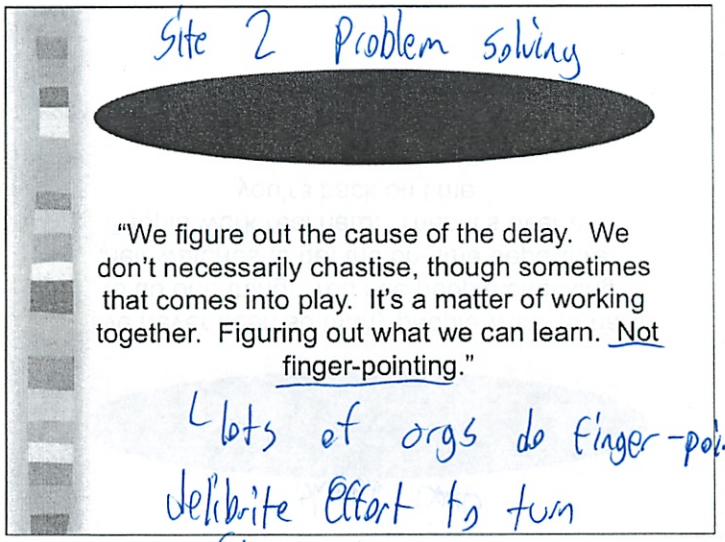
fine internally but not across

Site 1: Frequent and Timely Communication

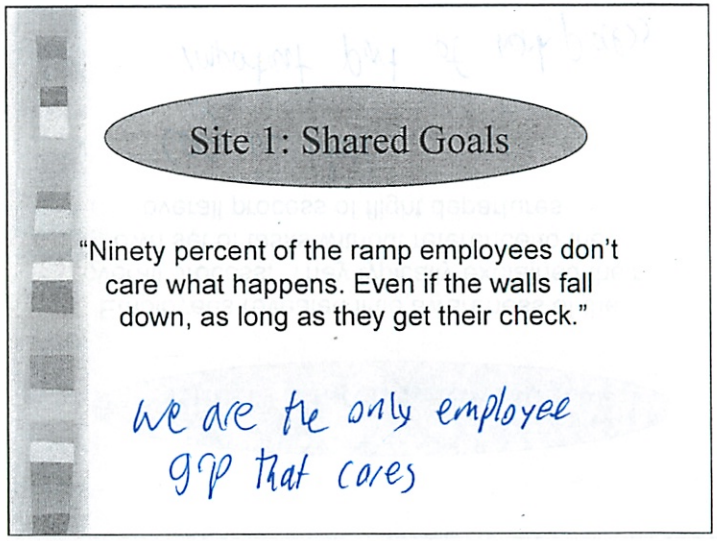
"Here you don't communicate. And sometimes you end up not knowing things… On the gates I can't tell you the number of times you get the wrong information from operations…The hardest thing at the gate when flights are delayed is to get information."







↳ lots of orgs do finger-pointing
deliberate effort to turn finger pointing into problem solving



we are the only employee grp that cares

Shared Goals

"I've never seen so many people work so hard to do one thing. You see people checking their watches to get the on-time departure. People work real hard. Then it's over and you're back on time."

Site 1: Shared Knowledge

Employees revealed little awareness of the overall process. They typically explained their own set of tasks without reference to the overall process of flight departures.

Cog in wheel

important part of work process

Shared knowledge

Employees had relatively clear mental models of the overall process -- an understanding of the links between their own jobs and the jobs of their counterparts in other functions. Rather than just knowing what to do, they knew why, based on shared knowledge of how the process worked.

Site 1: Mutual Respect

"There are employees working here who think they're better than other employees. Gate and ticket agents think they're better than the ramp. The ramp think they're better than cabin cleaners -- think it's a sissy, woman's job. Then the cabin cleaners look down on the building cleaners. The mechanics think the ramp are a bunch of luggage handlers."

- most industries when hierarchy

Q: does spreading knowledge help employees point finger?
- well finger pointing from how delays are measured
- allows them to help the other person

competing not to be lowest status

Mutal Respect

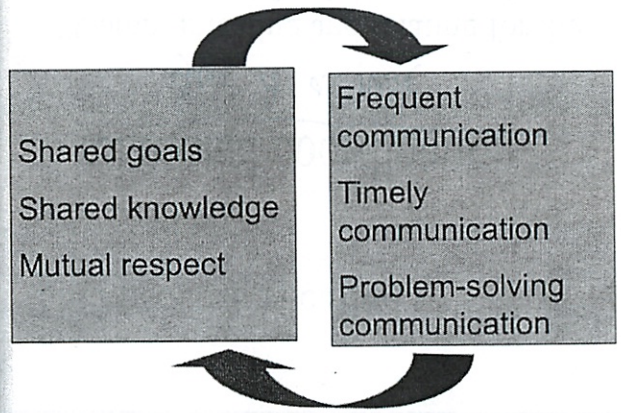
"No one takes the job of another person for granted. The skycap is just as critical as the pilot. You can always count on the next guy standing there. No one department is any more important than another."

did not study pay differentials

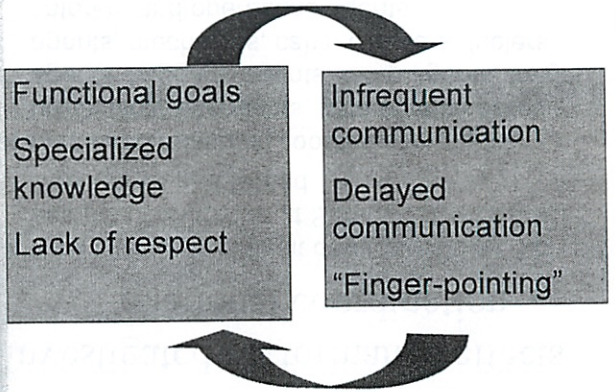
Findings

Relationships shape the communication through which coordination occurs ...

For better...



… Or worse



status differential

This process is called

relational coordination

gave it a name

"Communicating and relating for the purpose of task integration"

Investigated performance effects of relational coordination

- Nine site study of flight departures over 12 months of operation at Southwest, American, Continental and United
- Measured relational coordination among pilots, flight attendants, gate agents, ticket agents, baggage agents, ramp agents, freight agents, mechanics, cabin cleaners, fuelers, caterers and operations agents
- Measured quality and efficiency performance, adjusting for product differences

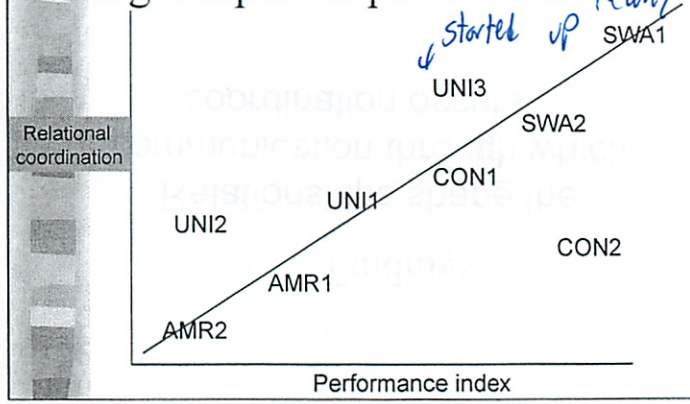
Relational coordination and flight departure performance

	Efficiency		Quality		
	Gate time/ flight	Staff time/ passenger	Customer complaints	Lost bags	Late arrivals
Relational coordination	-.21***	-.42***	-.64***	-.31*	-.50**
Flights/day	-.19****	-.37***	-.30***	.13	-.22+
Flight length, passengers, cargo	.79***	.45***	.13	.12	-.54**
Passenger connections	.12**	.19**	.09	.13	.00
R squared	.94	.81	.69	.19	.20

highly coordinated so grade index

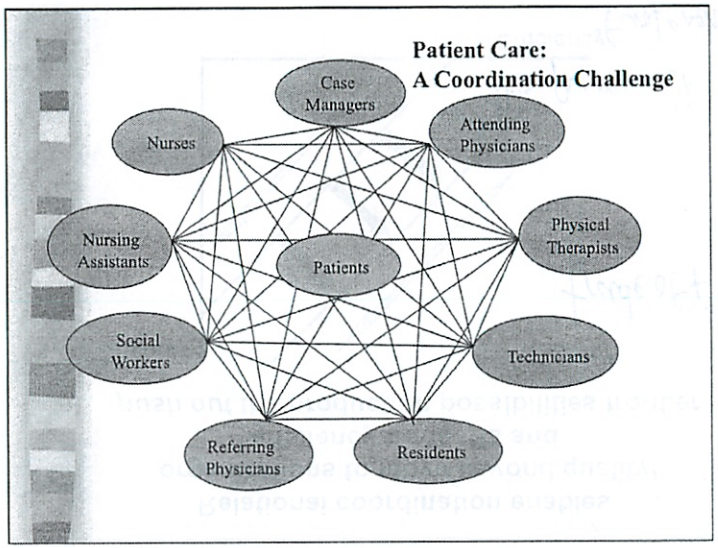
Begged for info/access

Relational coordination and flight departure performance



- personal relationships as designed shuttle
- but ran not institutionalized so petered out

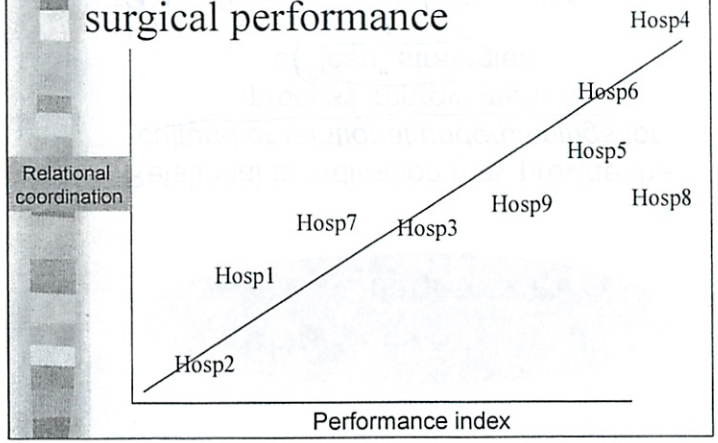
Does relational coordination matter in other industry settings?



Same study conducted in hospital setting

- Nine hospital study of 893 surgical patients
- Measured relational coordination among doctors, nurses, physical therapists, social workers and case managers
- Measured quality and efficiency performance, adjusting for patient differences

Relational coordination and surgical performance



When does relational coordination work?

Most important for achieving performance under conditions of

- Task interdependence
- Uncertainty
- Time constraints

Why does relational coordination work?

Relational coordination may provide the *cultural or relational underpinnings* for process improvement or "lean" strategies

take excess inventory out
difficult to run

Why does relational coordination work?

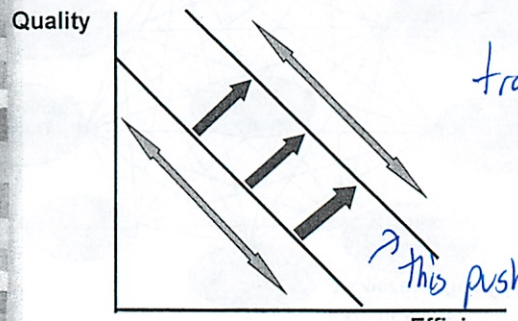
Relationships of *shared goals*, *shared knowledge* and *mutual respect* enable participants to connect in a meaningful way across functional and organizational boundaries

Allowing them to coordinate "on the fly"

Connect across boundries

- not wait for instructions

Relational coordination enables organizations to move beyond quality/ efficiency tradeoffs and *push out* the production possibilities frontier

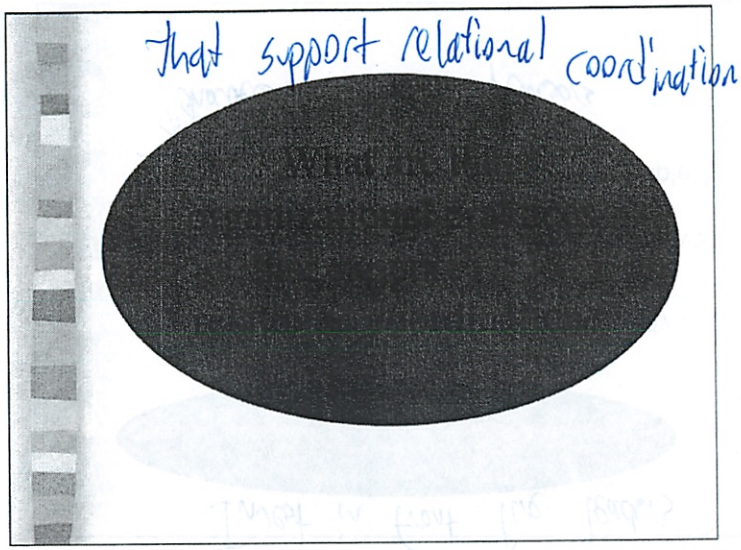


tradeoff b/w

this pushes it out

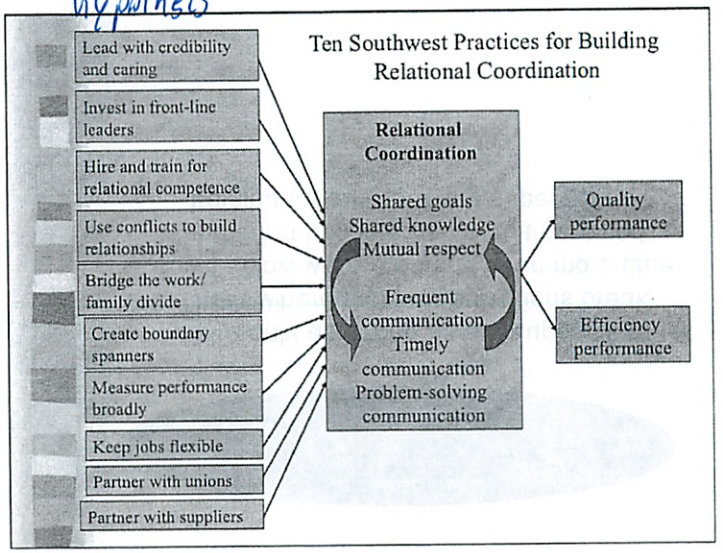
Fundamental process different

What are HR practices that support relational coordination?



esp w/ startup - happens naturally but as grow how do you support?

hypothesis



Lead with **credibility** and caring

"If I didn't work at SWA, I wouldn't work in this industry. At the other airlines, they don't trust the managers. The CEO says something and they don't believe what he says."

Very common sense

some symbolic importance of top management

Lead with **credibility** and caring

"It helps you as a manager when Herb gives it to the employees without sugar coating. Something about Herb, if he says it, it's law. Colleen is a very big part of this puzzle too. They've both got credibility. They've created this level of honesty with us. If it's bad, they tell you it's bad."

difficult to build up
Easy to lose

Lead with credibility and **caring**

"Herb is not your average CEO. He really cares to let people know he cares. When he talks to you, he is really focused on what you are saying. He sets the example of respect for everyone. All are important. Treat each other with the same respect as our customers. So people are happy."

Lead with credibility and **caring**

"Colleen and Herb communicate with customers and employees on every little issue. Their philosophy is to take care of the small problems. When someone has a problem here, even if it might seem small, I have to take care of it. It's a necessary element in the development of trust."

Invest in front line leaders

"The most influential leaders in our company ... are the front-line supervisors."

"While other airlines are cutting supervisors, we have a large number of supervisors to encourage, guide and give structure to people."

↑ shocked → largest supervisors

Invest in front-line leaders

"We're only as strong as our supervisors. That's where most organizations break down. Now we are putting even more time and effort into internal recruitment and training for our front-line supervisors."

not flat line as popular in 90s to empower employees but loss of influential people

supervisors also able to do the work – gives credibility

health Case manager
tech project manager

Create boundary spanners

"The operations agent's job is important. It's their responsibility to coordinate the flight. You need someone quarterbacking the flight departure. We are unique in that our operations agents are assigned to lead *only one departure at a time*. It's a good investment."

- 1 hr before
- 1 hr after

Some airlines they did 10-12/time/person from an office

- people are expensive

Create boundary spanners

Unlike at the other airlines, the boundary spanner role involves face-to-face interactions with every party involved in the flight departure process. It is coordination with a human face.

- not a pure low cost play
- huge investment
- but also takes boarding pass
- increase job description
- staff other pos. more keenly

Hire + Train for team

"We spend more money to recruit and train than any of the other airlines do. We take the time to find the right people to hire, at all levels within our organization, and we spend time training them. We really believe in the notion of 'one bad apple.' It's like a religion here."

have probation practice

not just good at job

Hire and train for relational competence

"It's mutual respect. We get it partly from the selection process. We really try to select people with the right attitude. We evaluate the impact they will have on internal and external customers."

"Something we look at is people who are very team-oriented from prior work experience. We say, take an incident from your prior work and walk us through it. Do they limit themselves to the job, or go above and beyond?"

Measure performance broadly

"We try to figure out what caused a delay, but we don't do much finger-pointing. We find that the more you point fingers, the more problems go underground rather than getting solved."

Orgs can't learn until they drive fear out
measurement systems drive conversations underground

if people think going to lose their job - bad

Measure performance broadly

"We had too many angry disagreements about whose delay it was. It was too hard to determine whose fault it was."

"The **team delay** is used to point out problems between two or three different employee groups in working together."

figure at as group

Use conflicts to *build* relationships

"What's unique about Southwest is that we're real proactive about conflict. We work very hard at destroying any turf battle once one crops up -- and they do. Normally they are not malicious or ill intentioned."

learning experience

"Because we are moving at a fast pace, miscommunication and misunderstandings happen sometimes. We take great pride in squaring it away as quickly as possible. Pilots and flight attendants -- sometimes an interaction didn't go right between them. We get them together and work it out, in a teamwork approach."

+ key spliers
- Boeing
- airport

Bridge the work/ family divide

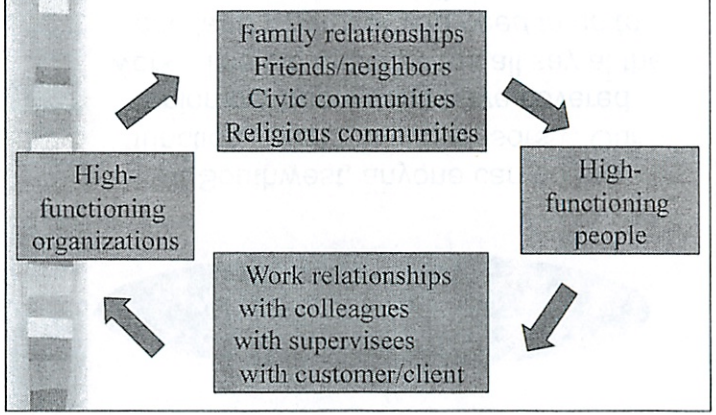
"People at Southwest care about one another's families. We recognize deaths and births. We help in times of tragedy…

"Kids and spouses feel the same way we do when they see a Southwest airplane. When we talk at company events, family members talk about Southwest as 'we.'"

Bridge the work/ family divide

"The whole concept is to be yourself and to have fun in your job. The relaxed atmosphere around here helps to ease the tension between departments."

Family and work relationships as mutually supportive



"Each person has a specific job, but part of the job is to help the other person. Then it's easier to work in a more efficient manner."

"At Southwest, anyone can do any function, even the supervisors… Our union contracts don't have covered work. The job descriptions all say at the end '*and whatever you need to do to enhance the overall operation.*'"

Make unions your partners

With the most highly unionized workforce in the U.S. airline industry, Southwest has also achieved the most positive labor relations:

- shortest time to contract
- fewest mediations
- fewest arbitrations
- fewest strikes

(Gittell, von Nordenflycht and Kochan, 2004)

Make unions your partners

"We bring them in and treat them like family, like we're working on something together, just like we do with everyone else."

"We try to stress with everybody that we really like partnerships."

Make unions your partners

Also key is trusting employees to choose their own representatives and respecting the legitimacy of the union.

"We really want them to have whoever they want."

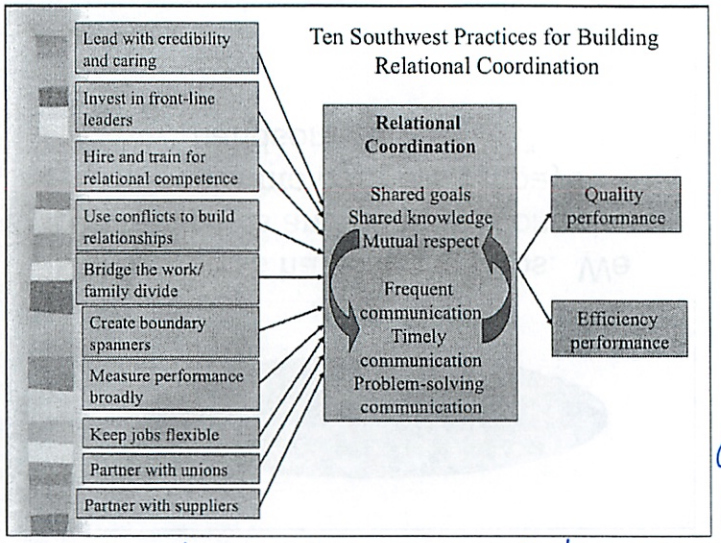
"Unions have their constituency, their customer base. We respect that."

"Southwest makes the airport part of their team. We make a presentation to them, and then they turn around and make one to us, saying 'here's how we see us working together.' That's unheard of in this industry."

"It gives you the impression that this is a group you really want to work with, as opposed to other airlines where you wonder if you can get them to call back. With Southwest you want to see what you can do for them. I think it pays huge dividends."

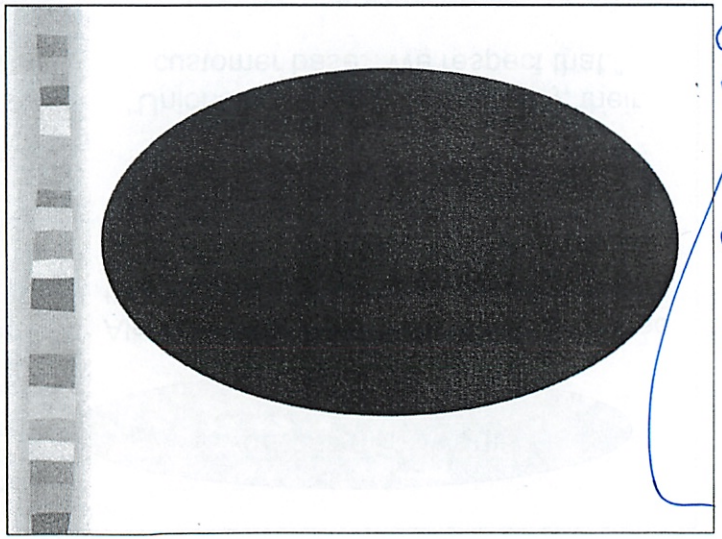
"Most pilots have strong egos. We turn pilots and air traffic control people into partners…It pays handsome dividends."

"With Boeing, it's like with everyone else. We try to make them understand that what's good for us is good for them. When you're as good a customer as we are, they listen. Boeing likes us because of our history together."



across the board practice

reinforce ties across divisions



can you transform later?

or must it be done as built? much easier

relationship repair

Maintain slow steady growth

VP Jim Denison: "We promise the marketplace 10 percent growth but we are only going to grow *as fast as we can manage.*"

Regional manager Matt Hafner: "It's nothing new with Southwest. The experts always think we need to expand at a more rapid pace. Apparently growth excites investors. But nobody is pushing us. That could never happen."

In 2010: Serves more customers per year in the U.S. domestic market than any other airline while remaining consistently profitable

if don't build structure - will fall apart

Avoid layoffs in crisis

"Nothing kills your company's culture like layoffs. Nobody has ever been furloughed at Southwest, and that is unprecedented in the airline industry. It's been a huge strength of ours. It's certainly helped us negotiate our union contracts…"

"We could have laid people off at various times and been more profitable, but I always thought that was short-sighted. You want to show your people that you value them and you're not going to hurt them just to get a little more money in the short term."

(Former CEO Herb Kelleher, *Business Week*, 1991)

Avoid layoffs in crisis

Even after 9/11, Southwest avoided layoffs altogether, saying it was more important to "take care of our people."

Reportedly losing "million of dollars per day "… Clearly we can't continue to do this indefinitely … [but] we are willing to suffer some damage, even to our stock price, to protect the jobs of our people."

(Former CEO James Parker, 1991)

Build financial reserves to protect relationships

"Most people think of us as this flamboyant airline, but we're really very conservative from a financial standpoint. We have the best balance sheet in the industry. We've always made sure that we never overreached ourselves. We never got dangerously in debt, and never let costs get out of hand…And that gave us a real edge during the Gulf War" (*and* post 9/11).

(Former CEO Herb Kelleher, *Business Week*, 1991)

Maintain relationships under pressure

Post-9/11 negotiation between Southwest and flight attendants was the most difficult for Southwest in recent history:

"The thing that made people angriest was that we took it outside the family. We did some demonstrations that weren't mean-spirited at all, but because we took it outside, people were upset. One slogan was 'Working for free is just plane nuts.' Our customers could relate to that."

(Thom McDaniel, TWU flight attendant leader)

Maintain relationships under pressure

President Colleen Barrett helped to mend the relationship after contract was ratified:

"My message to you is that we had a disagreement and we resolved it. We had a conflict but we are a family. Sometimes we fight, but we resolve our differences, move on and love each other."

Maintain relationships under pressure

"The credibility we got has created a much better relationship. Gary [CEO] and Laura [CFO] have tried to create a more constructive dialogue. We have a quarterly labor briefing when profits are reported [with all SWA unions]. So many more doors are open. We still walk a tightrope between advocacy and cooperation. But I don't think it would have happened if 'the girls' hadn't stood up for themselves."

(Thom McDaniel, TWU flight attendant leader)

Maintain relationships under pressure

"It's true, our employees are well-paid. They've produced the most efficient, most profitable airline with the best customer service and **they deserve to share the wealth."**

"Our people know what the airline industry environment is like. I am confident they will do what it takes to keep SWA on top. I would consider it a failure if we have to go to our employees and tell them to take a pay cut."

(CEO Gary Kelly, *The Wall Street Journal*, 2005)

share wealth w/ all employees - not good for share price

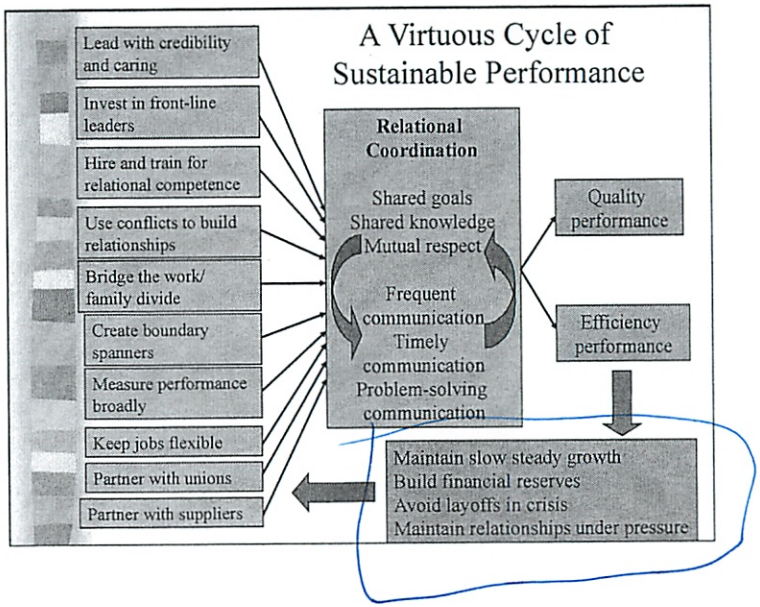
Maintain relationships under pressure

Attempted to purchase Denver-based Frontier Airlines to accelerate its growth there. But Southwest included in its bid a requirement that the Frontier and Southwest pilots would have to agree first on how to merge the two workforces.

Agreement did not come quickly enough and Republic Airways made the acquisition instead. CEO Gary Kelly publicly stated that SWA was willing to lose the bid for something as important as its future labor relations. Stuck to same principles in AirTran merger – this time it worked.

Maintain relationships under pressure

- Partnership approach is more challenging to achieve than other approaches
- Requires shift in thinking – seeing employees and suppliers as **source of value rather than cost**
- Not the approach typically favored by U.S. financial markets – so it requires getting investors on board
- Several approaches can work well for investors
- But the partnership approach produces the best outcomes for multiple stakeholders (see "Mutual Gains," Gittell, von Nordenflycht, Kochan, 2004)
- Therefore likely to be the most sustainable approach over time



Lecture Cont.

11/8

Jet Blue customized pratice
- 3 different deals

Also short-term plans
- no retirement, ~~[illegible]~~ scenario
- inequity

Others made it job can bring family up on
Now going back to just till get married
Different expectations
Very diff. relationship expectations

How to respond if employees want to form a union?

- one: better way to see their POV via their spokesman
- toughest sw part was post 9/11
  - quarterly meetings w/ all the unions
  - how we are doing
  - constant awareness
- always communication
  - open door - ok when small
  - then need formal
- need active communication w/ employees
  - even if have union
  - still direct communication

(2)

Supervisors provided this management ↔ employee communication

people unionize to muscel up what they don't have

start communication before unions starts up

pilots don't change airline very much

-so they are lst to unionize

Cost Performance for US Legacy and New Entrant Airlines[1]

Total Unit Costs ($ per available seat mile)		Total Unit Costs – Transport-related Costs ($ per available seat mile)		Labor Unit Costs ($ per available seat mile)	
US New Entrant Airlines					
JetBlue	.079	JetBlue	.078	JetBlue	.021
Southwest	.088	Southwest	.088	AirTran	.022
ATA	.097	ATA	.097	Frontier	.024
AirTran	.097	AirTran	.097	Spirit	.026
Spirit	.104	Frontier	.098	ATA	.028
Frontier	.109	Spirit	.104	Southwest	.034
US Legacy Airlines					
American	.125	Continental	.105	US Airways	.029
United	.132	Delta	.106	Delta	.030
Continental	.135	United	.108	Continental	.031
Northwest	.137	US Airways	.109	United	.031
Delta	.138	American	.110	Northwest	.032
US Airways	.146	Northwest	.118	American	.037

low on both

very low

Would be interesting

very different

labor a much larger %

- efficiency wage argument

- not stage lenght adjusted

[1] Data source: US Department of Transportation, Form 41. Published in Bamber, Gittell, Kochan and von Nordenflycht (2009). Up in the Air: How the Airlines Can Improve Performance by Engaging Their Employees.

Quality Performance for US Legacy and New Entrant Airlines[2]

Consumer Complaints (per 100,000 customers)		**On-time Performance** (percent)		**Baggage Handling Errors** (per 1,000 customers)	
US New Entrant Airlines					
Southwest	0.26	Southwest	80.1	AirTran	4.06
Frontier	0.66	Frontier	77.6	JetBlue	5.23
JetBlue	0.78	AirTran	76.8	Southwest	5.87
AirTran	0.83	JetBlue	70.1	Frontier	6.16
US Legacy Airlines					
Continental	1.09	Delta	76.9	Northwest	5.01
Northwest	1.43	Continental	74.3	Continental	5.33
American	1.65	United	70.3	United	5.76
Delta	1.81	Northwest	69.6	American	7.25
United Airlines	2.25	American	68.7	Delta	7.60
US Airways	3.16	US Airways	68.7	US Airways	8.47

much lower

had just moved call center to bag handlers

- can have union avoidance
- breakage
- partnership

- Organize to work together
- lot of perks to keep people disinterested
- Contental's big break

[2] Data source: US Federal Aviation Administration, Air Travel Consumer Report. Published in Bamber, Gittell, Kochan and von Nordenflycht (2009). Up in the Air: How the Airlines Can Improve Performance by Engaging Their Employees.

Southwest got rid a "hard ass" Unions employees - wanted to protect company

MID TERM QUIZ

COURSE		NUMBER
The Airline Industry		16.71J/1.232J/15.054J/ESD217J
DATE	TIME	# PAGES: 8
November 1, 2010	105pm to 225pm	
INSTRUCTOR		
Dr. Peter Belobaba		

Name Michael Plasmeier

Question	Max. Points	Points Obtained
1	36	26
2	15	14
3	19	16
Total	70	56

Median = 55

61 +	5
56-60	5 ←
51-55	4
50 -	5

INSTRUCTIONS

Please answer all questions in the space provided and use the reverse side of each page only if absolutely necessary to answer each question.

As the exam is worth a total of 70 points, you should plan on spending no more than 1 minute per allotted point. Plan your time accordingly, leaving enough time to review and proof-read your answers. If you do not understand any of the questions, please explain what assumptions you are making in order to answer the question.

This is a closed book exam. No personal computers may be used; however, calculators are allowed.

Prof: Watch time, spend 1 min per point

Yield • RPM - Unit cost = ASM = operational profit.

QUESTION 1 ***(36 points)***: For each of the following questions, provide brief explanations of the terms, concepts and relationships involved, as appropriate. You may use point form and sketch graphs in your explanation. *(6 points each).*

(A) Use the concepts presented in this course to explain why airlines typically operate smaller aircraft with higher frequency in short-haul markets, as compared to larger aircraft with lower frequency in long-haul markets.

Research has identified that freq. share is the most important component of market share. Airlines can capture more of the market if they offer more flights. Smaller aircraft have lower operating cost, so it is profit maximizing to use the smallest plane that meets the demand for each flight. Short haul have much higher yields in long haul markets, but higher unit cost as there are less miles to spread departure and fixed costs over.

2

more RPMs
Higher unit ← reduce costs
unit costs

ASMs decrease with smaller planes, but increase with more flights

? see soln.

(B) From the airline's perspective, describe two major operational disadvantages of operating at a connecting hub airport with fixed connecting bank times in the schedule. Explain how each disadvantage contributes to increased unit costs for the airline.

Any operational disruptions are magnified leading to costly recoveries that must be rolled in to Unit cost, rather than Flexible where only some passengers inconvenienced.

The airlines need to have a lot of station staff to handle the peak load in the bank, but must then pay them to sit idle the rest of the day. Likewise the airline needs more gates and all associated equipment just used at the peak time.

6

This gets rolled into unit costs.

(C) Identify three major factors that have contributed to an increase of over 40% in employee productivity (ASMs per employee) at US airlines during the period since 2000. For each factor, explain specifically how it has helped to improve this productivity metric.

Well first of all they cut a very large # of employees while only cutting ASMs partially, leaving the remaining employees with more to do.

Services like meals were cut, along with the people that prepare and serve them. Or a fee was added, so for less people used them (reservation call center, bags) allowing airlines to drop people and maintain ASMs. Technology made certain things possible without employees such as booking tickets online or checking in online, so the airlines could lay these people off. OK.

All changes reduced costs and employees while maintaining ASMs

6

(D) Explain in intuitive terms why it occurs that an airline with a higher frequency share than its competitor in a given market will typically enjoy an even higher market share. Why is this relationship between frequency share and market share not proportional?

Having a wide selection of departures will make your airline the go-to airline for business travelers looking to rack up loyalty points and who know it is easier to change their flight if needed, and if something goes wrong there are more chances to recover. For the other airline it is the reverse. This does not include cost efficiencies of scale, such as spreading out station costs. explain

3

See soln.

Economic

0. Demand Forcasting - What does the future of the industry/economy look like?

(E) Identify the major steps of the airline schedule development process. For each step, describe briefly the principal decision of that step.

1. Fleet planning - How many aircraft to buy and maintain?

2. Route level demand forcasting - Where to fly/how often/capicty?

3. Station/gate leases - Where should we maintain gates/slots? Station equipment?

3. Schedule - Where and when should we fly?

4. Aircraft planning - Fleet assignment What aircraft should fly each route?

5. Crew planning - Let crew bid for each bid sheet

6. Maintenance planning - Fill maintenance in on the holes in the schedule, may also be done as part of #4

(F) Describe two major reasons why average load factors in the airline industry have increased from about 70% in 2000 to over 80% in 2010. Explain specifically how these forces have caused average load factors to increase.

Airlines have cut fuel hungry aircraft, parking them in the desert. This cut ASMs, and since demand (RPMs) has not fallen in as large a proportion, load → $\frac{RPMs}{ASMs}$ increased.

In addition airlines may be more willing to fill empty seats at low prices through the revenue management system. More people flying will increase RPMs as ASMs stay constant → increasing load.

26

QUESTION 2 ***(15 points)***

Miami Airlines operates a 100-seat Embraer 190 aircraft from Boston to Miami, a distance of 1258 miles. It uses the EMSRb model to determine the number of seats to make available for each fare class based on a nested booking class structure. For a specific future Friday departure of this flight, you are provided with the following information.

	RESTRICTIONS			INPUTS TO EMSRb MODEL		
Fare Class	Advance Purchase	Min. Stay	PRICE	FORECAST DEMAND Mean	Sigma	BOOKING LIMIT
Y	0	0	$300	25	8	100
M	7	3 days	$200	35	10	78
Q	14	Sat Night	$100	50	20	37

(A) The two major components of airline revenue maximization are differential pricing and yield management (also known as revenue management). Define each of these terms and explain the differences between the two concepts. *(4 points)*

Differential pricing - attempting to segment customer demand by willingness to pay. For example, business travelers who do not want to stay Sat night could not buy Q class.

Revenue Management - Protecting seats at each fare level (determined by differential pricing) for the predicted # of people who would buy higher priced tickets. This is because the higher priced tickets are the last to sell.

setting fares + restrictions → one time up front

how many seats to sell at each price → updates daily

4

(B) Describe (do not calculate) the impacts on the EMSRb booking limits of the following changes. In each case, explain why the change in booking limits makes sense. Assess each change separately relative to the BASE CASE above.

(i) The airline decides to use a larger 120-seat aircraft for this flight departure, with no change to the baseline expected demand levels. *(3 points)*

The predicted number of people willing to buy Y and M class tickets do not change (assuming you are not changing your fares). Instead these extra 20 seats ~~would~~ be allocated to Q class, where average demand exceeds even the new number of seats avalible for Q class.

3

(ii) The demand for this flight is expected to be higher than originally predicted, so the mean demand forecasts are increased by 20% for all 3 fare classes, while capacity remains at 100. *(3 points)*

3

More seats should be allocated to Y and M classes to meet the demand of these higher paying passengers. We would rather have these people than Q fare passengers, who only get what is left over, in this case less seats, even though Q demand has increased. This is to maximize revenue and because all same cost, thus profit maximized as well.

(C) Define "diversion" in the context of this question and explain why it can occur. Using specific examples for the above base case, suggest two different actions the airline can take to reduce the probability of diversion on this flight. *(5 points)*

When a passenger with a higher willingness to pay (let's say $300) is happy buying a cheaper ticket, because the restrictions on the cheaper ticket are still acceptable. For example the $300 WTP business traveler is going to a 4 day conference he booked a month in advanced. He can buy a $200 "M" class ticket, however, because he qualifies. The airline should make low fare tickets as undesirable as possible with many restrictions, such as a bag fee for Q-tickets or a change fee. The airline needs to be careful that its competitors don't offer a better deal, however.

4

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QUESTION 3 ***(19 points)***

You are provided with the following 6 aggregate measures for a fleet of 20 aircraft of the same aircraft type with a capacity of 130 seats, operated by a large network airline on a sub-network of primarily short-haul domestic routes.

(1) Average block speed (miles per block hour)	350
(2) Average departures per aircraft per day	4.5
(3) Daily aircraft utilization (block-hrs per day)	9.0
(4) Total Unit Costs ($/ASM)	$0.08
(5) Passenger Unit Revenue ($/ASM)	$0.09
(6) Passenger Yield ($/RPM)	$0.12

revenue / revenue
RPM

revenue · RPM
revenue

$$= \frac{\text{avg block speed} \cdot \text{utilization}}{\text{departures per day}}$$

(A) Calculate the following additional measures for this fleet of aircraft based on the above data, if possible (show your work). If it is not possible to calculate the measure, explain why:

(i) Average stage length *(3 points)*

$$\frac{\frac{\text{miles}}{\text{hr}} \cdot \frac{\text{hrs}}{\text{day}}}{\frac{\text{departures}}{\text{day}}} = \frac{\text{miles}}{\text{hr}} \cdot \frac{\text{hrs}}{\text{day}} \cdot \frac{\text{day}}{\text{departures}} = \frac{\text{miles}}{\text{departure}}$$

$$= \frac{350 \cdot 9.0}{4.5} = 700 \text{ miles}$$

(ii) Average load factor *(3 points)*

$$\frac{\text{RPMs}}{\text{ASMs}} = \frac{\text{revenue} / \frac{\text{revenue}}{\text{RPM}}}{\text{seats} \cdot \frac{\text{miles}}{\text{day}}} = \frac{.09 \cdot 409500 / .12}{130 \cdot 350 \cdot 9} = \frac{307,125}{409,500} = 75\%$$

Revenue = Yield (revenue) · ASMs

6

a lot of work!

(B) The average age of the current fleet of this aircraft type is 15 years. The airline is considering the replacement of all 20 aircraft of this type with 20 new aircraft with the same seating capacity (130 seats). Identify the 4 major components of Flight Operating Costs (FOC) per block-hour, and describe the expected impacts of this fleet replacement on each of the 4 component cost categories, once all of the new aircraft have been delivered placed into service. That is, how will each component of FOC per block-hour change and why? *(8 points)*.

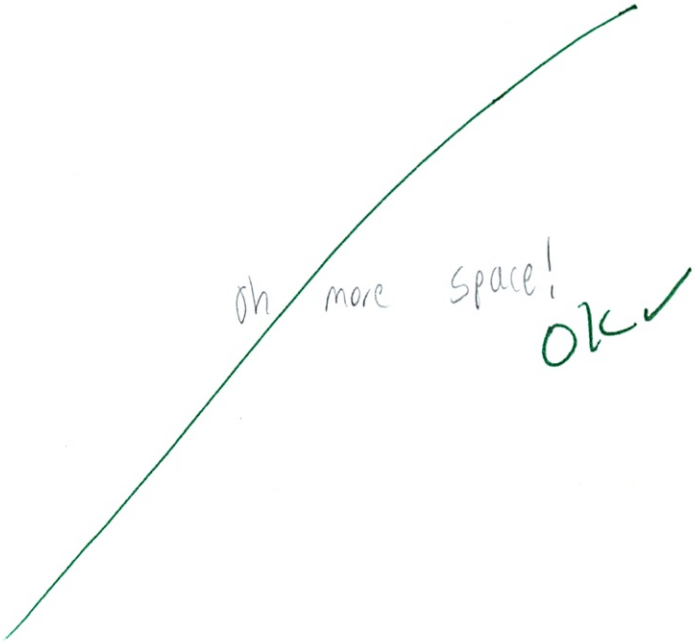
Fuel - The new aircraft are more fuel efficient so the fuel cost will decrease sharply

Crew Labor - This is pilots. The new aircraft may be at a different payscale, increasing costs. However costs are likly to be steady. There may be a temp. training cost, however

Maintance - Newer aircraft will require less maintance decreasing this cost category.

7

Ownership Cost - new planes must be paid off or leased whereas the old planes either cost less to lease or have already been paid off. Ownership cost will increase sharply.



(C) The replacement aircraft will increase the level of fleet commonality of aircraft types in the overall fleet of this network carrier. Describe two major reasons why fleet commonality is important for an airline, and explain the specific benefits in each case. *(5 points)*

Increased flexibility - In case of issues a plane can just be substituted without requiring a ~~different~~ crew that is able to fly that replacement aircraft.
Less training expenses. Only 1 simulator to buy.
Since size and likely seating is the same - no advantage from not having to reassign passengers. not with rest of fleet!
Decreased maintance costs - Mechanics only have to be trained on 1 aircraft and maintain parts for 1 aircraft.
The ground servicing equipment only needs to support one type of aircraft. Only one set of instructions, MELs, etc to maintain

3

16

commonality of several types.

35 min through
15 min done ✓

Mid Term Suggested Solutions

QUESTION 1 ***(36 points)***: For each of the following questions, provide brief explanations of the terms, concepts and relationships involved, as appropriate. You may use point form and sketch graphs in your explanation. *(6 points each).*

(A) Use the concepts presented in this course to explain why airlines typically operate smaller aircraft with higher frequency in short-haul markets, as compared to larger aircraft with lower frequency in long-haul markets.

All else equal, airlines would prefer to use larger aircraft with lower unit costs, independent of length of haul.

In short-haul markets, we tend to see higher frequency with smaller aircraft because:

- *Schedule displacement (wait) times are a much higher proportion of total trip time than in long-haul markets, so increased frequency has a much bigger impact on total demand for air travel.*
- *Short-haul markets are more likely to have modal alternatives, so increasing frequency and reducing total trip time is more important than in long-haul markets.*
- *With an airline competitor in the same market, frequency share becomes even more important to capturing market share, leading to more departures with smaller aircraft.*

(B) From the airline's perspective, describe two major operational disadvantages of operating at a connecting hub airport with fixed connecting bank times in the schedule. Explain how each disadvantage contributes to increased unit costs for the airline.

- *Fixed connecting bank times result in longer ground times for aircraft and crews, both at the hub (to accommodate connecting passengers and baggage) and at spokes closer to the hub (waiting for the next departure time into a hub connecting bank). This reduces aircraft and crew utilization, increasing unit costs.*

- *Such a hub operation can lead to concentrated scheduling of flight arrivals and departures at the hub, perhaps above the airport's capacity. This can lead to congestion and delays, and it certainly requires staffing of personnel for the peak connecting periods, which increases labor costs.*

(C) Identify three major factors that have contributed to an increase of over 40% in employee productivity (ASMs per employee) at US airlines during the period since 2000. For each factor, explain specifically how it has helped to improve this productivity metric.

- *Legacy airlines have cut the number of employees by 140,000 without reducing ASMs by a corresponding proportion, causing ASMs/employee to increase.*

- *Bankruptcy actions allowed legacy airlines to change union contracts and achieve relaxed work rules that allow individual employees to perform a wider range of tasks, increasing the productivity of each employee.*

- *Increased use of technology – internet distribution, e-ticketing and self check-in – shifted some of the previous activities of airline employees to the passenger, thereby increasing employee productivity.*

(D) Explain in intuitive terms why it occurs that an airline with a higher frequency share than its competitor in a given market will typically enjoy an even higher market share. Why is this relationship between frequency share and market share not proportional?

The "S-curve" model suggests that a competitor offering 4 out of six flights in a market (67% frequency share) will capture an even higher market share.

This effect can be explained in one of two ways:

- *Airline A offers 4 flights in each direction, meaning 16 round-trip alternatives to each traveler, while Airline B offers 2 flights and only 4 round-trip alternatives. Because most passengers travel round-trip, the effective frequency share is 16:4 rather than 4:2.*
- *Airline A shares the time of day demand with Airline B for the 2 flight times offered by B, while it captures virtually all of the time of day demand around its other 2 flights which have no competition.*

(E) Identify the major steps of the airline schedule development process. For each step, describe briefly the principal decision of that step.

- *Frequency Planning – how many departures per day (or per week) given demand estimates and competition.*
- *Timetable Development – at what times will each flight depart and arrive (develop a schedule map)*
- *Fleet Assignment – which aircraft type(s) should be used for each flight departure to maximize contribution.*
- *Aircraft Rotation Planning – ensure a balance of arrivals and departures by type at each station.*

(F) Describe two major reasons why average load factors in the airline industry have increased from about 70% in 2000 to over 80% in 2010. Explain specifically how these forces have caused average load factors to increase.

- *Supply side: Airlines have reduced overall capacity (ASMs) by cutting back on frequency and/or aircraft size (more regional jets). Through better fleet assignment optimization, they are able to match the capacity on each flight to the forecasted demand, increasing load factor.*

- *Demand side: For any given level of capacity, increased use of differential pricing, revenue management techniques and then internet distribution sites has allowed airlines to better fill up empty seats with lower fare passengers, increasing RPMs and load factor.*

QUESTION 2 ***(15 points)***

Miami Airlines operates a 100-seat Embraer 190 aircraft from Boston to Miami, a distance of 1258 miles. It uses the EMSRb model to determine the number of seats to make available for each fare class based on a nested booking class structure. For a specific future Friday departure of this flight, you are provided with the following information.

	RESTRICTIONS			INPUTS TO EMSRb MODEL		
Fare Class	Advance Purchase	Min. Stay	PRICE	FORECAST DEMAND Mean	Sigma	BOOKING LIMIT
Y	0	0	$300	25	8	100
M	7	3 days	$200	35	10	78
Q	14	Sat Night	$100	50	20	37

(A) The two major components of airline revenue maximization are differential pricing and yield management (also known as revenue management). Define each of these terms and explain the differences between the two concepts. *(4 points)*

Differential Pricing: Offering multiple fare products in the same O-D market, each with different price points and different amenities and/or restrictions on their purchase and use.

Yield Management: Give the above fare structure, determining the number of seats to allocate to each fare product/class by protecting seats for forecasted late-booking higher fare demands on specific future flight departures.

Differential pricing sets a fare structure that tries to segment the total demand. Yield management optimizes the fare class booking limits to maximize expected revenue for each flight.

(B) Describe (do not calculate) the impacts on the EMSRb booking limits of the following changes. In each case, explain why the change in booking limits makes sense. Assess each change separately relative to the BASE CASE above.

(i) The airline decides to use a larger 120-seat aircraft for this flight departure, with no change to the baseline expected demand levels. *(3 points)*

Adding 20 seats to the capacity will increase the Q-class booking limit from 37 to 57. The number of seats protected for Y and M classes will not change according to the top-down protection logic of EMSRb. The new nested booking limits will be Y 120 M 98 Q 57.

The optimal protection levels for the higher classes are independent of the total capacity. Once we have protected 63 seats for Y+M, all remaining seats should be made available to Q.

(ii) The demand for this flight is expected to be higher than originally predicted, so the mean demand forecasts are increased by 20% for all 3 fare classes, while capacity remains at 100. *(3 points)*

The demand forecasts for Y and M increase to 30 and 42 respectively (i.e., by 5 and 7). The Y class limit is still 100, but we will protect 5 more seats for Y-class, reducing the M limit by 5, to 73. The joint protection for the revised Y+M demand will increase by about 12, reducing the Q class limit to 25.

With higher forecast demands in all classes, it makes sense to protect more Y and M, and reject more Q class demand in order to maximize total flight revenues.

(C) Define "diversion" in the context of this question and explain why it can occur. Using specific examples for the above base case, suggest two different actions the airline can take to reduce the probability of diversion on this flight. *(5 points)*

Diversion occurs when a passenger with a higher willingness to pay is able to purchase a lower fare due to inadequate restrictions and/or excessive availability (too high booking limits).

In this case, the airline could reduce diversion by:

- *Increasing the severity of restrictions on the lower fares – for example, giving Q-class a 21-day advance purchase requirement, which would make it more difficult for Y and M passengers to divert.*
- *Reducing the number of seats available to the lower classes – lowering the Q-class booking limit could help to force some passengers with higher WTP to sell-up to the higher fares.*

QUESTION 3 ***(19 points)***

You are provided with the following 6 aggregate measures for a fleet of 20 aircraft of the same aircraft type with a capacity of 130 seats, operated by a large network airline on a sub-network of primarily short-haul domestic routes.

(1)	Average block speed (miles per block hour)	350
(2)	Average departures per aircraft per day	4.5
(3)	Daily aircraft utilization (block-hrs per day)	9.0
(4)	Total Unit Costs ($/ASM)	$0.08
(5)	Passenger Unit Revenue ($/ASM)	$0.09
(6)	Passenger Yield ($/RPM)	$0.12

(A) Calculate the following additional measures for this fleet of aircraft based on the above data, if possible (show your work). If it is not possible to calculate the measure, explain why:

(i) Average stage length *(3 points)*

Block-hours per departure = 9.0/4.5 = 2 block hours
*Average stage length = Block hours per departure * Average block speed = 2 * 350 = 700 miles*

(ii) Average load factor *(3 points)*

Passenger unit revenue/passenger passenger
= (Passenger Revenue/ASM) /(Passenger Revenue/RPM) = RPM/ASM = 0.09/0.12 = 75%

(B) The average age of the current fleet of this aircraft type is 15 years. The airline is considering the replacement of all 20 aircraft of this type with 20 new aircraft with the same seating capacity (130 seats). Identify the 4 major components of Flight Operating Costs (FOC) per block-hour, and describe the expected impacts of this fleet replacement on each of the 4 component cost categories, once all of the new aircraft have been delivered placed into service. That is, how will each component of FOC per block-hour change and why? *(8 points).*

CREW COSTS – Expected to stay approximately the same per block-hour for the same size aircraft, but initial training costs could increase crew costs. And, some unions might demand a higher pay rate for flying newer aircraft. Note: Crew costs include pilots only.

FUEL COSTS – Should decrease per block-hour given more fuel efficient engines on newer aircraft.

MAINTENANCE COSTS – Should also decrease per block-hour as newer aircraft require less frequent maintenance and won't need a major maintenance overhaul for about 5 years.

OWNERSHIP COSTS – Will increase per block-hour, as depreciate rates will be higher for newer aircraft if owned, and rental rates will be higher if leased.

(C) The replacement aircraft will increase the level of fleet commonality of aircraft types in the overall fleet of this network carrier. Describe two major reasons why fleet commonality is important for an airline, and explain the specific benefits in each case. *(5 points)*

Fleet commonality refers to different aircraft types in an airline's fleet that have similar characteristics, and have been acquired from the same manufacturer. Simple fleet commonality reduces maintenance costs due to a smaller spare parts inventory required, and less type-specific training and equipment required for maintenance personnel.

If the aircraft types are also common-rated with others in the same aircraft family, then additional benefits are possible as pilots and flight attendants can fly on different types. This reduces overall training costs and increases the flexibility of aircraft and crew scheduling, improving productivity and lowering unit costs.

Aircraft can also be swapped much more easily, either in response to irregular operations or as a planned swap – increasing revenues and/or reducing operating costs.