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Judging a book by its cover: the relationship between service and safety quality in US national and regional airlines

Dawna L Rhoades, PhD, *Embry Riddle Aeronautical University*

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Dawna L. Rhoades*, Blaise Waguespack Jr

Department of Business, Embry Riddle Aeronautical University, 600 S. Clyde Morris Blvd, Daytona Beach, FL 32114-3900, USA

Abstract

The general public perception is that service quality among US airlines has declined significantly since deregulation, however, there is continuing debate among experts on the effect of deregulation on safety quality. Unlike safety quality, service quality is more visible to the traveling public. It is not clear, however, whether service quality is a good indicator of safety quality. We addressed this issue by examining the service and safety quality of 20 US regional carriers for 1991–1997. Service and safety rates were calculated for each carrier. Then carriers were ranked on service and safety quality. Spearman's rho correlations were calculated on these lists. The results indicate that for four of these seven years the Spearman's rho was significant indicating that service quality is an excellent indicator of overall safety quality among US national and regional carriers. © 2000 Elsevier Science Ltd. All rights reserved.

1. Introduction

In its 1996 Strategic Plan, the Federal Aviation Administration (FAA) called ValuJet a model start-up airline that proved that the US policy of deregulation was sound and workable (Schiavo, 1997). On May 11, 1996, ValuJet Flight 592 crashed into the Florida Everglades killing 105 passengers and 5 crew members. Prior to June 17, 1996 when the FAA announced the shutdown of ValuJet, the agency continued to insist that the carrier was safe. In fact, the FAA has long insisted that all US carriers were equally safe. However, in the Fall of 1996, Thomas McSweeney, FAA Director of Aircraft Certification, made a point of noting that the FAA is responsible only for the basic evaluation of airlines who are expected to police, evaluate, report, and improve themselves (Schiavo, 1997). The FAA which is responsible for establishing minimum safety standards and evaluating airline compliance has consistently refused to rank airlines or determine which carriers, if any, exceed minimum standards (Nader and Smith, 1994; Schiavo, 1997; Tampa Tribune, 1998). Critics have charged that the FAA has allowed its mission to promote air travel to take precedence over its responsibility to create a regulatory environment that promotes safety (Nader and Smith, 1994;

Schiavo, 1997; Roy, 1998). In fact, one of the chief questions posed by a recently commissioned FAA study into the possible public release of safety information such as inspection and maintenance records was "Would the routine release of such information increase or decrease public confidence in the safety of air transportation?" (Roy, 1998).

According to the General Accounting Office (GAO), there are four main factors that affect the safe operation of airlines — (1) financial stability, (2) maintenance quality, (3) management attitude, and (4) pilot competence (General Accounting Office, 1988, 1996). Unfortunately, none of these factors are readily apparent to the general traveling public. However, the traveling public is in a much better position to judge the service quality of the airlines they fly. This raises the question of whether there is a link between the service and safety quality of air carriers. Unlike safety, there are no minimum, federally mandated standards for service quality. Presumably, the market is the sole determinant of the level of service quality that a carrier will provide. Since airlines are free to choose the level of service quality, possibly a carrier could provide high levels of safety quality without providing a similar level of service quality. On the other hand, we might expect that managerial (and employee) attitudes toward safety quality would be reflected in the level of service quality and that the financial condition of the carriers would have an impact on both areas of quality.

* Corresponding author. Tel.: + 1-904-226-7756; fax: + 1-904-226-6696.

E-mail address: rhoadesd@cts.db.erau.edu (D.L. Rhoades)

The purpose of this study was to investigate the link between service and safety quality. We sought to answer three questions. First, what is the level of service and safety quality for US national and regional carriers? Second, what is the relationship between service and safety quality in these carriers? Third, can service quality levels be used as proxy measure of national/regional carrier safety quality?

2. Background

In 1978, the US deregulated the domestic airline industry. Proponents of deregulation argued that regulation forced carriers to accept uneconomical load factors on many long-haul flights, prevented the establishment of economies of scale, and created fares on regulated routes that were in many cases 50% higher than unregulated intrastate routes (Caves, 1962; Jordon, 1970). According to the contestable market theory (see Baumol et al., 1982 for further discussion), governments should seek to promote contests for markets, even those where large firm size and limited competitors existed. Regulation was said to encourage competition based on service quality rather than price, limit operational flexibility, and create no incentives for improved efficiency and productivity. Critics of deregulation have suggested that government policy now focuses almost solely on creating cheap, below-cost air fares and has resulted in destructive price wars (Dempsey and Goetz, 1992; Woerth, 1995).

The response of the airline industry to deregulation has been a restructuring that has changed the face of US aviation. Financial crisis in the early 1980s led to industry consolidation and the creation of the hub-and-spoke system, which eliminated sources of competition. In the early 1990s an industry-wide loss of nearly \$10 billion dollars saw airlines develop complex holding structures, expand non-airline and/or discrete services, and race to create seamless global service networks, primarily through strategic alliances (Rosen, 1995).

Some of the results of this turmoil are clear. According to a recently published study on the cost competitiveness of international carriers, the major US airlines (revenues over \$1 billion) as a whole are more cost competitive than all but some of the lower wage Asian carriers (Oum and Yu, 1998). The major airlines share of passengers at US hub airports has also increased from 55% in 1985 to 79% in 1998 (DeBarros, 1998). At the same time, traffic along the spokes has been increasingly carried by regional airlines (gross revenues less than \$100 million) whose smaller aircraft and lower cost structure presumably make these low volume routes profitable. In fact, in 1998, there were 718 US airports served by regional/commuter carriers as compared to only 216 served by major or national carriers (AvStat, 1998). Finally, although the number of airlines operating in the US has increased

from 43 to 90 since deregulation, more than 200 new-entrant carriers have come and gone as a result of bankruptcy and merger (Rosen, 1995; Shifrin, 1998). Unfortunately, these results do not speak to changes in either service or safety quality following deregulation. Here there is far less agreement.

2.1. Service quality

Antidotal evidence suggests that the overall level of service quality among US carriers has declined significantly since deregulation, however, there are no studies actually examining the pre- and post-deregulation levels of service quality. Issues of airline quality have primarily been addressed through surveys conducted on frequent business flyers. For example, J.D. Powers and Associates has worked with *Frequent Flyer* magazine for the past six years to publish a quality survey of the major US airlines. The survey provides an overall ranking as well as individual “bests” for such categories as ease of check-in, seat comfort, gate location, and post-flight services. However, these cross-sectional results are difficult to duplicate and compare.

In 1991, the airline quality rating (AQR) system developed by the Institute of Aviation Research at Wichita State University began its annual review of airline quality. Unlike other quality rankings, the AQR uses published, publicly available data to construct a multi-factor weighted average of airline quality for the major US carriers. Much of the data is collected from the Air Travel Consumer Report published quarterly by the US Department of Transportation. Unlike surveys, the AQR provides a consistent, longitudinal measure of airline quality and the results can be replicated. However, the AQR, which has reported a negative industry average level of quality for all six years of its’ existence, has been criticized. Airlines have complained about the weighting scheme which, for example, assigns a negative weight to airline load factor (the percentage of available seats that are filled by paying passengers). A second criticism relates to the nature of the complaints included in the AQR. By and large data included in the AQR relate to the provision of basic service (i.e., on-time percentage, flight problems, denied boardings, refunds, fare complaints, etc) and not passenger amenities (i.e., seat comfort, ease of check-in, schedule availability, meal quality). This makes a direct comparison between the AQR and the survey quality ratings difficult and open to criticism that the AQR does not accurately reflect factors consumers consider important (Perkins, 1998). There is another difference between the AQR and the survey studies. The AQR includes safety related measures — average age of fleet, number of accidents, and pilot deviations — while survey methods typically do not consider safety issues.

Neither the airline quality surveys, nor the AQR, have addressed the issue of service or safety quality for the

national or regional US carriers. Like any research dealing with small businesses, there are problems relating to data availability that can be attributed to at least two factors. The first is timely reporting by smaller firms. The second is the turnover in this type of population. However, two recent studies have compared service quality between major and national/regional carriers in the US as well as between the individual national/regional carriers. Both studies used the complaint data from the Air Travel Consumer Report to conclude that there is a substantial difference in the service quality of major and national/regional carriers. Rhoades et al. (1998) have reported that US major carriers averaged six complaints per 10,000 departures in 1996 while US national/regional carriers averaged three complaints per 1000 departures. There was also substantial variation between national/regional carriers. Two national/regional carriers posted 1996 complaint rates lower than the major carriers while several other national/regional carriers had rates far higher than the industry average for this group. In a second study, Rhoades and Waguespack (2000a) concluded that there were statistically significant differences between the level of service quality among national/regional carriers.

2.2. *Safety quality*

While there has been little debate about the effect of deregulation on service quality, its effect on safety quality has been hotly debated. Two studies have examined pre- and post-deregulation accident rates. Both studies have reported a substantial decline in the overall accident rate (Barnett and Higgins, 1989; Rose, 1989,1990). Oster and Zorn (1989) addressed the possible reasons for the decline in the accident rate and report an overall decline of 54% in total accidents per million departures, with a 71% reduction in accidents initiated by equipment failure. However, it is not clear, for example, whether the decline in equipment failure is due to improved equipment reliability and design, maintenance quality or both. Kennet (1993) has found that although the length of time between engine maintenance has increased since deregulation there has been no effect on engine failure. This would suggest that equipment design is largely responsible for the decline in accidents attributed to equipment failure. If equipment design and reliability have improved, then the fact that the US fleet is aging raises some concern. In 1988, only 28% of the US fleet were over 20 yr old. By 2000, 40% of the fleet is projected to be over 20 yr old (Schiavo, 1997). The average age of the fleet flown by regional carriers tends to be even older than their major carrier counterparts (Wilson, 1997). In addition, after sharp declines in accident rates during the 1950s and 1960s attributable to improved jet engine reliability, the accident rate has leveled off in recent years at approximately 3–4% annually (Booz et al., 1996). Several studies

have also reported a recent increase in the rate of accidents which may reflect either normal variation in accident rates, lagged effects of reduced maintenance, or some other cause (Rose, 1990,1992).

Research into airline safety has focused on four areas of concern: financial stability, maintenance quality, pilot competence, and management attitude (General Accounting Office, 1988).

2.2.1. *Financial stability*

A number of researchers have argued that safety expenditures are an investment because they yield returns over time and that it is plausible that unprofitable or insolvent airlines would reduce the level of investment in maintenance and safety (Graham and Bowes, 1979; Lee, 1996). Additionally, financial issues might cause carriers to defer maintenance expenditures either due to the direct cost of such maintenance or the need to keep the aircraft in-service (Roland, 1997). Carriers can invest in safety by (1) scheduling maintenance more frequently, (2) using newer equipment to reduce the probability of equipment failure, (3) relying on more experienced personnel, (4) implementing more intensive training programs, and (5) purchasing newer aircraft that have more advanced safety technology (Rose, 1990). In short, Lee (1996) has suggested that aviation safety is a direct function of the amount of money spent.

Rose (1990,1992) has reported that lower operating profit margins are associated with higher accident and incident rates in the following year. This relationship is even stronger for regional carriers than their major carrier counterparts. There are several possible explanations for these results. First, regional carriers tend to outsource maintenance tasks because small fleet size does not make it economical to invest in the equipment necessary to service their aircraft. This outsourcing may create certain quality problems. Second, the average age of the aircraft flown by regional carriers is substantially older than most major carriers (Wilson, 1997). Third, the experience level (and pay levels) of regional flight crews is generally lower than major carriers (Aviation Week and Space Technology, 1999). Finally, the average lifespan of most regional carriers may not permit them to institutionalize the practice of safety (Kanafani and Keeler, 1989).

Not all researchers agree that regional or new entrant carriers have lower safety performance. Kanafani and Keeler (1989) found no difference in safety levels and, in fact, reported that new entrants appear to be spending more resources on maintenance than the large established carriers. Whether this higher spending is a consequence of the age of the fleet or attributable to higher safety standards was not addressed.

2.2.2. *Maintenance quality*

The most commonly used measure of maintenance quality has been the level of maintenance expense.

Several factors that can increase the level of maintenance expenditure are the age of the aircraft in the carriers fleet, the type and mix of aircraft in the fleet, and the level of maintenance outsourcing (General Accounting Office, 1988; O'Toole, 1992). While smaller carriers have not previously been required to report maintenance costs, the General Accounting Office has reported that carriers who spent more on maintenance between 1955 and 1983 actually had a higher accident rate than other airlines. One explanation for this result is the fact that older aircraft have higher maintenance costs and are more likely to be involved in accidents.

2.2.3. Pilot competence

The FAA (1995) has reported that 60–80% of all airplane accidents are caused by human error. While air traffic control accounts for some of these errors, it is the flight crew that is responsible for the majority of accidents attributable to human error (General Accounting Office, 1988). Pilot competence is a function of training, experience, capability, and attitude. Although airlines are required to maintain FAA approved training programs there is wide variation in training methods (General Accounting Office, 1988). Compared to major carriers, the experience level (and pay levels) of regional carriers is generally much lower. A recent survey by *Aviation Week and Space Technology* (1999) reported that national/regional pilots could expect to make on average one-half to one-third the salary of their major carrier counterparts. Still, it is difficult to link flight experience and competence of pilots to accident rates (General Accounting Office, 1988).

2.2.4. Management attitude

The attitude of airline managers toward safety has been cited in numerous studies as an important factor in assessing the overall safety of an airline (Banfe, 1992; General Accounting Office, 1988; Lee, 1996). Accordingly, an unsafe company could increase its operational safety for minimal costs by improving organizational factors such as communications and personnel selection and local factors such as workplace 'safety consciousness' (Lee, 1996). Banfe (1992) found that the intelligence of an organization's structure and its management are key factors in firm success. Unfortunately, experts agree that management attitude is judgmental and subjective, making it difficult to quantify.

2.3. Linking service and safety quality

Perhaps the difficulty in quantifying 'management attitude' provides the link between service and safety quality. Studies of Total Quality Management and ISO 9000 quality programs consistently cite the presence of a 'quality culture' and top management support as critical to the success of any quality program (Deming, 1982; Koo et al.,

1998; Mallak et al., 1997). These attitudes are expected to permeate the organization and affect everything the firm does. Our question was "Can organizations create a quality culture that extends to only some aspects of their operation and not to others?" Is it possible for a carrier to be rated highly on safety quality and not on service quality?

3. Method

This study included data on 20 US regional carriers in operation between 1991 and 1997. For our purposes, a national/regional carrier is defined as one having operating revenues less than \$1 billion. Of these carriers, 12 were not in operation for the entire period. Some carriers started operation during this period (e.g., Vanguard and Kiwi). Other carriers were either acquired (e.g., Carnival and ValuJet) or ceased scheduled operation (e.g., Kiwi and Western Pacific). Data for this study was collected from three sources. The Department of Transportation's Air Travel Consumer Report was the source for consumer complaints and includes the following categories: ticketing, refund, fare, advertising, customer service, credit, and other. Unfortunately, carriers with less than 10 total complaints are not reported separately but included in an "other US airlines" category. Since it was not possible to determine the actual number of complaints for carriers in this last category, it was treated as a missing value. The FAA's online safety databases were used to collect information on accidents, incidents, and near mid-air collisions. Data on pilot deviations was collected directly from the FAA's Office of System Safety. Total departures per year were collected from the Bureau of Transportation Statistics.

Service and safety rates were calculated overall and by year for all carriers. The service quality rate represents the sum of all complaints divided by total yearly departures and can be interpreted as the number of quality problems per departure — i.e. a service quality rate of 0.005325 would translate into five service quality problems per 1000 departures. The safety quality rate represents the sum of all accidents, incidents, near mid-air collisions, and pilot deviations divided by total yearly departures and can be interpreted in a manner similar to the service quality rate. Correlations were calculated between service and safety averages for each carrier and each year of the study. Since both rates were divided by departures, we treated the averages as matched pairs and compared the means by year and carrier using the paired *t*-test. Because paired *t*-test calculations with fewer than four observations proved to be unstable, carriers with less than four observations were not included. Finally, the carriers were ranked by year and overall means for both service and safety quality. These ranked list were then compared using the Spearman's rho correlation. If

the safety rank were identical to the service rank, then the Spearman's rho would yield a perfect 1.0. We would then conclude that service quality provides consumers with an excellent proxy of carrier safety quality. The lower the Spearman's rho, the greater the difference between the service and safety quality of regional carriers and the less validity service quality has as a measure of safety quality.

4. Results

Tables 1 and 2 report the calculated service and safety quality rates, respectively. For all years of the study, the safety rate is lower (better) than the service rate. When these safety rates are compared to those reported by Rhoades and Waguespack (1999), national/regional carriers do not perform as well as the major US carriers. For example, the overall safety rate for national/regional carriers was two safety problems per 10,000 departures while the overall safety rate for major carriers was eight problems per 100,000. Table 3 reports the correlations and results of the paired *t*-test by year and overall for the national/regional carriers. For all but three years of the study, the correlation between the average service and safety quality rate was significant. The difference between the service and safety means was significant only for one year (1996). Thus, we conclude that there is no statistical difference between the service and safety quality means for the remaining years. The difference between the overall service and safety mean was also significant.

Table 4 presents the number of observations, correlations, and *t*-values by carrier for all carriers with three or more reported yearly values. Four carriers (Air South, Alaska, Reno Air, and Tower) recorded a negative correlation between service and safety quality. The *t*-value was statistically significant for five carriers (Alaska, Carnival, Comair, Hawaiian, and Tower) indicating that their mean levels of service and safety quality are statistically different. Table 5 reports the number of yearly observations and the results of the Spearman's rho test. The Spearman's rho was statistically significant for the years 1994–1997. The overall Spearman's rho was also significant. The Spearman's rho test indicates that for these years there is a statistically significant, strong correlation between the service quality ranking of US national/regional carriers and their safety quality ranking.

5. Discussion

We began this study by asking whether US air travelers could use their impression of the service quality of the national/regional carriers to judge the safety quality of those same carriers. The answer is yes. For those years where we obtained data on 12 or more carriers, there is a strong, statistically significant relationship between the service and safety quality rankings of national and regional carriers. While the relationship is not a perfect one, we did not obtain a Spearman's rho below 0.54 while the highest value was 0.87. We had argued that

Table 1
Service quality rate for regional airlines

Airline	1991	1992	1993	1994	1995	1996	1997	Avg. TC
Air South					0.001013	0.003916	0.012777	0.005902
AirTrans				0.002972	0.000585	0.001493		0.004054
Alaska	0.000143	0.000162	0.000116	0.000254	0.000263	0.000304	0.000377	0.000231
Atlantic SE				0.000039	0.000058	0.000223	0.000184	0.000126
Business Express		0.000046	0.000046	0.000170	0.000026	0.000567		0.000214
Carnival	0.003181	0.001596	0.002222	0.002440	0.002485	0.010379		0.006238
Comair		0.000095	0.000087	0.000060	0.000067	0.000076	0.000100	0.000081
Eastwind							0.002860	0.002860
Frontier						0.000717	0.000657	0.000687
Hawaiian	0.000785	0.000816	0.000601	0.000430	0.000401	0.000505	0.000662	0.000600
Horizon						0.000043	0.000100	0.000072
Kiwi				0.000601	0.000738	0.005185	0.010875	0.004350
Markair			0.001335	0.001012	0.018110	0.010665		0.009929
Mesa						0.000112		0.000112
Midway				0.001350	0.000494	0.001898	0.000740	0.001121
Midwest								
Reno				0.000210	0.000367	0.000408	0.000690	0.000419
Tower	0.005930	0.006793	0.009434	0.019899	0.008720	0.013593	0.024466	0.012691
Valujet				0.000545	0.001014	0.003029		0.002568
Vanguard						0.002485	0.003938	0.003212
Western Pacific						0.000991		0.000991
Industry Avg	0.002510	0.001585	0.001977	0.002316	0.002453	0.003158	0.004494	0.002823

Table 2
Safety quality rate for regional airlines

Airline	1991	1992	1993	1994	1995	1996	1997	Avg. TC
Air South					0.000145	0.000385	0.000211	0.000247
AirTrans				0.005944	0.000146	0.000299		0.002130
Alaska	0.000125	0.000119	0.000045	0.000082	0.000090	0.000045	0.000063	0.000081
Atlantic SE			0.000049	0.000024	0.000009	0.000021	0.000032	0.000025
Business Express	0.000183	0.000108	0.000075	0.000089	0.000026	0.000378		0.000143
Carnival	0.000245	0.000199	0.000089	0.000193	0.000166	0.000256		0.000191
Comair		0.000088	0.000080	0.000048	0.000061	0.000036	0.000049	0.000060
Eastwind							0.000000	0.000000
Frontier						0.000055	0.000141	0.000098
Hawaiian	0.000080	0.000102	0.000109	0.000036		0.000067	0.000060	0.000076
Horizon						0.000052	0.000043	0.000048
Kiwi				0.000300	0.000046	0.000232	0.000253	0.000208
Markair			0.000072	0.000112	0.000150			0.000111
Mesa						0.000035	0.000086	0.000061
Midway						0.000035	0.000082	0.000059
Midwest	0.000088	0.000045	0.000039	0.000067	0.000089	0.000140	0.000130	0.000085
Reno			0.000038	0.000139	0.000061	0.000049	0.000077	0.000073
Tower	0.000423	0.000358	0.001347	0.000195	0.000748	0.000197	0.000239	0.000501
Valujet				0.000204	0.000206	0.000125		0.000178
Vanguard					0.000085	0.000121	0.000114	0.000107
Western Pacific						0.000045		0.000045
Industry Avg	0.000191	0.000146	0.000194	0.000572	0.000144	0.000135	0.000079	0.000226

Table 3
Correlations and results of paired *t*-test by year

Year	<i>N</i>	<i>r</i>	Paired <i>t</i> -test
1991	4	0.97 ^b	1.849
1992	6	0.97 ^c	1.383
1993	7	0.97 ^c	1.557
1994	12	0.05	1.065
1995	12	0.43	1.716
1996	18	0.43	2.760 ^a
1997	12	0.86 ^c	2.069
Overall	19	0.27	3.187 ^b

^a*p* < 0.05.

^b*p* < 0.01.

^c*p* < 0.00.

‘quality’ is an attitude that should permeate organizations affecting all aspects of their operation. In the case of national/regional carriers this appears to be true.

These results, however, contrast sharply with a similar study comparing the service and safety quality of major US carriers. Rhoades and Waguespack (2000b) reported no statistically significant relationship between the service and safety rankings for the nine major US carriers in their study. What accounts for this difference in findings? Several factors may individually or collectively contribute to the observed differences. First, the major carriers as a group tend to be more homogeneous in terms of service and safety quality than regional carriers. Accord-

Table 4
Correlations and paired *t*-test by airline

Airline	<i>N</i>	<i>r</i>	Paired <i>t</i> -test
Air South	3	– 0.02	1.597
Alaska	7	– 0.39	3.552 ^b
Atlantic SE	4	0.46	2.395
Business Express	5	0.97 ^b	0.795
Carnival	6	0.57	2.642 ^a
Comair	6	0.42	2.538 ^a
Hawaiian	6	0.63	9.985 ^c
Kiwi	4	0.34	1.724
Reno Air	4	– 0.49	3.033
Tower	6	– 0.45	4.450 ^b

^a*p* < 0.05.

^b*p* < 0.01.

^c*p* < 0.00.

ing to Rhoades and Waguespack (2000b), as a group, major carriers also have service and safety rates well above the industry average for the national/regional carriers calculated in this study (e.g., Overall major service rate for 1991–1997 was seven problems per 10,000 departures as compared to three per 1000 for national/regional carriers). Overall, the safety rate for the majors was eight problems per 100,000 departures compared to two problems per 10,000 for national/regional carriers. Second, the average lifespan of the major carriers is far higher than their national/regional counterparts. This has potentially allowed the major carriers more time to institutionalize safety/service practices. Third, by their very

Table 5
Spearman's rho of ranked results by year^a

Year	N	Spearman's rho
1991	4	0.800
1992	6	0.714
1993	7	0.536
1994	13	0.748 ^b
1995	14	0.848 ^b
1996	19	0.650 ^b
1997	12	0.872 ^b
Overall	19	0.742 ^b

^a $p < 0.05$.

^b $p < 0.01$.

$p < 0.00$.

nature regional carriers do not compete directly with many of their so-called regional counterparts, while the major US carriers do compete in many markets. This competition could encourage the major carriers to either differentiate themselves by offering a higher level of service than similar carriers in the target market or adopt the same level of service offered by other market competitors. In some sense, national/regional carriers have no comparable strategic group member to benchmark their performance. Finally, in order to operate carriers must meet minimum safety levels, but no such levels exist for service quality. New entrant carriers are more likely to focus on safety quality first and hope that passengers lured by cheap fares will accept lower levels of service quality.

This study is not without its limitations. The complaints gathered from the Air Travel Consumers Report deal primarily with issues of basic service, that is the ability to issues tickets and refunds correctly and in a timely manner, to avoid flight problems and overbooking, and to deal honestly and politely with consumers in advertising, marketing, and flight operations. Although there is a category for other complaints, the Report does not specifically address areas of quality such as meals, seat comfort, and in-flight entertainment. However, in the case of national/regional carriers, this emphasis on basic service issues is probably more appropriate. Regional carriers as a general rule seek to compete by trading off amenities for lower fares. Many such carriers offer no-frill, single-class service.

There are also several questions that might be raised over the calculation of our safety rates. We chose to treat accidents, incidents, near midair collisions, and pilot deviations as equal safety events. Obviously, from a passenger perspective an accident would be rated far worse than a pilot deviation, however, it is not clear to the authors that an accident is a better indicator of the overall level of airline safety than a pilot deviation or incident. Accidents are fortunately rare occurrences and often the result of multiple factors. In the absence of compelling evidence of

the relationship between the four types of safety events used in this study, we opted for the equal weighting.

There are a number of practical implications to be drawn from this research for managers as well as passengers. Service quality matters not simply because it sells tickets, but because a service quality attitude has the potential to affect all aspects of airline operation. Providing basic, timely, consistent service requires the same attention to detail that maintenance and flight operations do. Quality is a matter of process development, training, implementation, tracking, and continuous improvement. If a carrier can institutionalize a quality process for safe operations, then the carrier has the tools and skills, and only needs the commitment, to bring the same skills to the service side of the operation.

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