

Impact of delays on customers' safety perceptions and behavioral intentions

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Received June, 2012

Accepted December, 2012

Abstract

Purpose: The main objective of this paper is to examine how the customers' perceptions of delays and safety relate to each other and to behavioral intentions

Design/methodology/approach: We modified a customer satisfaction questionnaire to include questions relating to the constructs we wanted to examine and collaborated with a major international airline to collect data from 797 customers through in-flight surveys.

Findings: We obtain three key original findings. First, perceived safety exerts a direct positive effect on behavioral intentions. Second, perceived delays exert an indirect effect mediated by perceived safety. Finally, customers believe operational practices affect both delay and safety.

Originality/value: This is the first paper that examines the customer's perspective on two of the most important aspects of airline operations management: delays and safety. Our findings are of great value to managers who want to evaluate the impact of delays and safety on customers and to researches interested in the theoretical relationships between these two constructs.

Keywords: Perceived delays, perceived safety, behavioural intentions, safety cues

1. Introduction

Airline punctuality and safety are important concerns for the flying public. According to a recent US Department of Transportation (2011) study, about 25% of all flights in the US were delayed in the first two months of 2011.

Starr (2001) notes that safety has always been a critical facet of quality management, but that operations management needs to focus more on safety issues. The analysis of airline safety differs fundamentally from that of flight delays because the former cannot be quantified as easily. The (fortunate) rarity of fatal airline crashes makes direct measurement of safety difficult, forcing researchers to use proxies such as accident and incident rates (Raghavan & Rhoades, 2005).

Air travel is safe in absolute terms: Barnett and Wang (1998) estimate passenger death risk to be about one in 8 million on First-World domestic jet flights. Yet, approximately 35% of Americans are afraid to fly (Miletich, 1990). Researchers have been arguing that airline safety expenditures should be regarded as investments that pay off over time through increased customer demand (Raghavan & Rhoades, 2005). But this will only be the case if customers perceive airlines that invest more in safety as being safer.

The negative impact of delays on passenger satisfaction is well-documented (e.g., Ferrer, Rocha e Oliveira & Parasuraman, 2012). Abdelghany, Shah, Sidhartha and Abdelghany (2004) found that punctuality is a key factor in the attraction of new customers and the retention of current ones. However, the extent to which expected delays affect a customer's choice of airline is not as clear, as customers rarely have access to relevant information (such as which of the alternative flights they can take is less likely to be delayed) at the time they make their purchase decision.

The key to assessing the impact of quality improvement efforts on profitability lies in understanding their influence on customer perceptions and patronage. This is particularly important when quality efforts deal with intangible aspects of services (Rust, Zahorik, & Keiningham, 1995). It is therefore necessary to connect internal quality metrics to customer behavior. Figure 1, adapted from Bitran and Lojo

(1993), depicts the connection between operational processes, behavioral intentions, and profitability. Rust et al. (1995) point out that quality improvements affect profits directly through a reduction in costs or indirectly through an increase in revenue. In the case of airline operations management, the cost reductions (represented in Figure 1 by the arrow connecting Operational Processes to Profitability) are well known and can be readily quantified, reflecting the significant advances operations managers have made in understanding the Internal Environment. The indirect revenue effects are more difficult to quantify and are typically left out or over-simplified in optimization models.

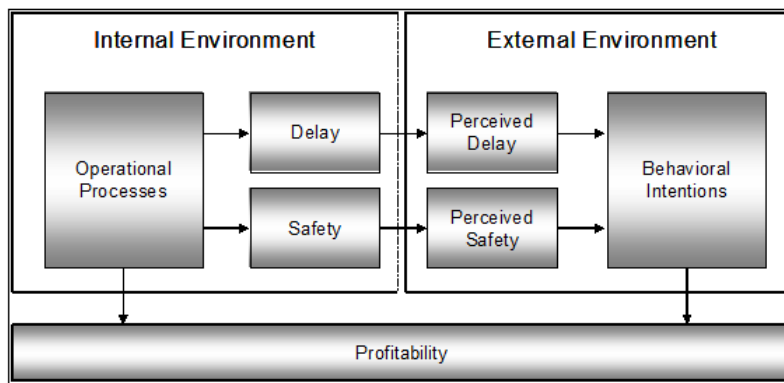


Figure 1. Framework connecting operational processes, behavioral intentions, and profitability

2. Key issues examined

Connecting perceived delays to behavioural intentions

Much attention has been paid to the effects of delays on customers (see Bitran, Ferrer & Rocha e Oliveira, 2008). There is general consensus in the literature that delays have a detrimental effect on customers' service evaluations and behavioral intentions. We therefore predict that perceived delays will have a negative impact on behavioral intentions.

Connecting perceived safety to behavioural intentions

Safety is an antecedent of *perceived* safety, and profitability is a consequence of behavioral intentions. Thus, a positive relationship between safety and profitability is consistent with the notion that perceived safety favorably impacts behavioral intentions.

Fatal crashes are one of the few safety-related events that are readily apparent to customers and significantly affect their perceptions of an airline's safety. The media are particularly fascinated by deaths resulting from plane crashes (Trevison, 2000). Moreover, news reports of airline crashes are typically vivid - attracting and holding attention and exciting the imagination (Nisbett & Ross, 1980), thereby producing a strong effect on customer perceptions and judgments (McGill & Anand, 1989). We thus conclude that fatal crashes are very likely to exert a negative effect on customers' perceptions of an airline's safety, whereas other accidents and incidents in general may not be apparent to customers and hence may not affect them.

Rose (1992) suggests that when a fatal crash occurs, both perceived safety and the airline's revenues decrease. Since revenues are a direct consequence of the customers' behavioral intentions (see Figure 1) we posit that the adverse effect on revenues of a decline in perceived safety is mediated through behavioral intentions. Therefore, we expect that perceived safety will have a positive impact on behavioral intentions.

Connecting perceived delays to perceived safety

Situations involving attributes that customers must assess with missing or incomplete information have been studied extensively in the psychology literature. Indirect transitive inference provides a link between delays and safety: if a delay is related to operational practices and operational practices are related to safety (as in the internal environment in Figure 1), then the delay is related to safety (c.f. Lewicki, Hill & Czyzewska, 1994). In order to make sense of the relations between predictions, actions, and outcomes, customers must have an underlying causal model (Einhorn & Hogarth, 1982). One reasonable causal model is that delays and safety failures are both caused by faulty operational processes. Thus, from the customer's perspective, an airline with faulty operational processes is more likely to have fatal crashes and a higher number of incidents resulting in delays.

In summary, customers will make inferences about safety through observable attributes that are perceived to be correlated to safety. A causal sequence in which delays and safety are linked through a common cause -- operational practices -- provides the basis for such a correlation. We thus expect perceived delays to have a negative impact on perceived safety.

3. Methodology

We collaborated with a major international airline (Airline hereafter) that routinely administers a customer satisfaction questionnaire to randomly selected customers on each flight. We added items to this questionnaire to measure the constructs necessary to examine the links among perceived delays, perceived safety and behavioral intentions (the questionnaire items are in the Appendix).

The data were collected over a period of two months in mid-2006. The Airline's flight attendants requested four randomly selected customers in each flight to fill out the customer satisfaction survey. We obtained completed surveys from 797 customers, 255 of whom indicated that their flights were delayed, while the remaining 542 indicated that their flights departed on time. Table 1 summarizes key demographic information about the sample, which closely resembles the overall demographic profile of the airline's customers; Table 2 provides Pearson bivariate correlations between the study's variables.

Gender	63% male, 37% female
Age	Average: 41.15 years old
Residence	55.6% live in the Airline's home country

Table 1. Demographics

	D	S	B11	B12	B13	B14	B15	C1	C2	T1
DELAY	1									
SAFETY	-.119***	1								
B11	-.046	.408***	1							
B12	-.061*	.467***	.853***	1						
B13	-.071*	.455***	.824***	.887**	1					
B14	-.063*	.454***	.615***	.702**	.700***	1				
B15	-.084**	.498***	.658***	.743**	.704***	.772***	1			
CONTROL1	n.a.	-.139**	-.271***	-.225**	-.274***	-.156**	-.150**	1		
CONTROL2	n.a.	.173*	.319***	.304**	.305***	.252**	.272***	-.521***	1	
TANGIBLES1	-.096***	.588***	.432***	.428**	.397***	.342***	.379***	-.114	.235***	1
TANGIBLES2	-.090**	.487***	.433***	.434**	.431***	.384***	.389***	-.047	.225***	.629***

*** 1% significance; ** 5%; and * 10%

Table 2. Pearson bivariate correlations between variables. There is no correlation between "DELAY" and the "CONTROL" variables because the "control" questions were only answered by the passengers whose flights were delayed

4. Results

Main results: Perceived safety mediates the impact of perceived delay on behavioural intentions

The discussion in previous sections suggests a mediation model linking perceived delays, perceived safety, and behavioral intentions (see Figure 2). Behavioral Intentions were measured using the five items listed in the Appendix, which were combined into a single scale (Cronbach's alpha = 0.93).

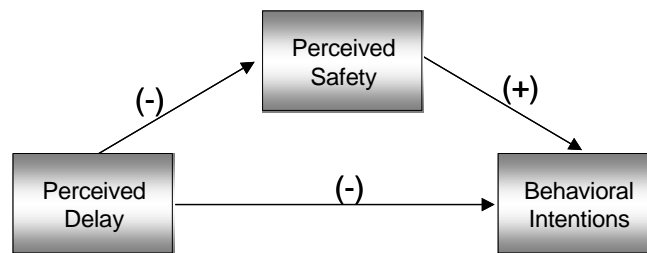


Figure 2. Perceived safety mediates the impact of perceived delay on behavioral intentions

We tested this model by following Baron and Kenny's (1986) three-step procedure for detecting mediation effects.

We first regressed the mediator on the independent variable – eq (1) – to check if the latter affects the former (i.e., coefficient β_D in eq (1) is significant):

$$SAFETY = \beta_0 + \beta_D DELAY \quad (1)$$

Next, we regressed the dependent variable on the independent variable – eq (2) – to check if the latter affects the former (i.e., coefficient B_D in eq (2) is significant):

$$BEHAVIOR = \beta_0 + \beta_D DELAY \quad (2)$$

Finally, we regressed the dependent variable on both the independent variable and the mediator – eq (3) – to verify that the mediator affects dependent variable (i.e., coefficient B_S is significant), and that the effect of the independent variable decreases (i.e., B_S in eq (3) is less than B_D in eq (2)):

$$BEHAVIOR = \beta_0 + \beta_D DELAY + \beta_S SAFETY \quad (3)$$

The results from estimating regression equations (1), (2), and (3) are summarized in Table 3. All coefficients except the *DELAY* coefficient in eq (3) are significant at the 0.05 level. Thus, Baron and Kenny's (1986) three conditions for mediation are satisfied. Moreover, *SAFETY* fully mediates the effect of *DELAY* on *BEHAVIOR* since the B_D coefficient in eq (3) is not significant. We further verified the indirect effect of delays on behavioral intentions via perceived safety through the Sobel test (Sobel, 1982), which was significant at the 0.001 level.

Regression Eq Safety-Delay	Coefficient (unstandardized)	Std. Error
Constant	4.506***	0.035
Delay	-0.202***	0.062
Regression Eq Behavior-Delay		
Constant	21.061***	0.189
Delay	-0.652**	0.331
Regression Eq Behavior-Delay-Safety		
Constant	8.988***	0.777
Delay	-0.119	0.288
Safety	2.684***	0.169

*** 1% significance; ** 5%; and * 10%

Table 3. Results of regressions used to test mediation model

Complementary results: Further support for the proposed causal sequence

Perceived safety is negatively correlated with perceptions of the service provider's control over the delay

If our theory outlined above and summarized in Figure 2 is correct, then we would expect customers who assume that a delay has occurred because the airline mismanaged an operational process (i.e., the airline could have done something to avoid or reduce the delay but did not) to have lower perception of the airline's safety. On the other hand, we would expect customers who assume that there was nothing that the airline could have done about the delay to infer that the airline is capable of managing all operational processes successfully and thus their perception of the airline's safety should increase. We measured these two aspects of perceived control through two separate items (see Appendix) that had a significant correlation of -0.521 between them (Cronbach's alpha was 0.68).

The correlations between perceived safety and the *CONTROL* variables (presented in Table 2) support this explanation. High ratings on the *CONTROL1* item (Airline

could have done something to shorten the delay) refer to a low assessment of the airline's operational capabilities, so the significant negative correlation observed (-0.139, significant at the 5% level) supports our theory. Likewise, low ratings on the *CONTROL2* item (There was nothing Airline could have done to prevent the delay) reflect inferences about operational incompetence, so the positive correlation (0.173, significant at the 1% level) obtained also offers support for our theory. It therefore seems important to keep customers informed about the causes of delays and to reassure them that the delays are unrelated to safety, tactfully making sure that they understand that the causes of the delay in no way related to operational practices that might compromise their safety.

Perceived safety mediates the impact of tangibles on behavioral intentions

Customers' use of delays as a cue in making inferences about safety (as supported by our mediation-analysis results reported in Section 4), which they are unable to observe directly, suggests that they are likely to use additional cues to make safety inferences. One likely source of such cues is the tangible aspects of the service encounter (Parasuraman, Zeithaml & Berry, 1985). Tangibles relate to the appearance of physical facilities, equipment, personnel, and communication materials.

Tangibles are more than just cues about safety; they are also intrinsically important (e.g., customers prefer a clean seat over a dirty seat) and therefore directly affect customers' service-quality perceptions and the behavioral intentions that follow (Parasuraman et al., 1985). Figure 3 presents a mediation model depicting the proposed relationships among tangibles, perceived safety and behavioral intentions.

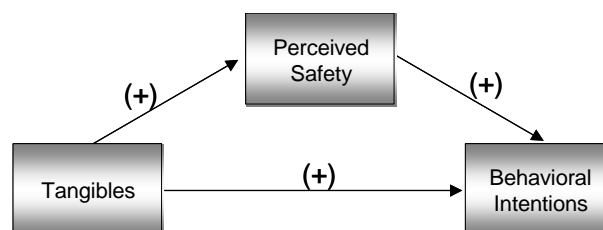


Figure 3. Perceived safety mediates the impact of tangibles on behavioral intentions

Customer ratings on the two questionnaire items relating to tangibles are strongly correlated with perceived safety (see Table 2), supporting the notion that customers look for safety cues because of their inability to directly observe safety. The strength of these correlations is noteworthy, especially relative to that of the

control-perceived safety correlations. The distributions in Figure 4 offer further evidence that customers are likely to use visual attractiveness as another proxy for safety—the changes in the distributions of perceived safety as one moves from left to right (i.e., from “strongly disagree” to “strongly agree” on visual attractiveness) is dramatic.

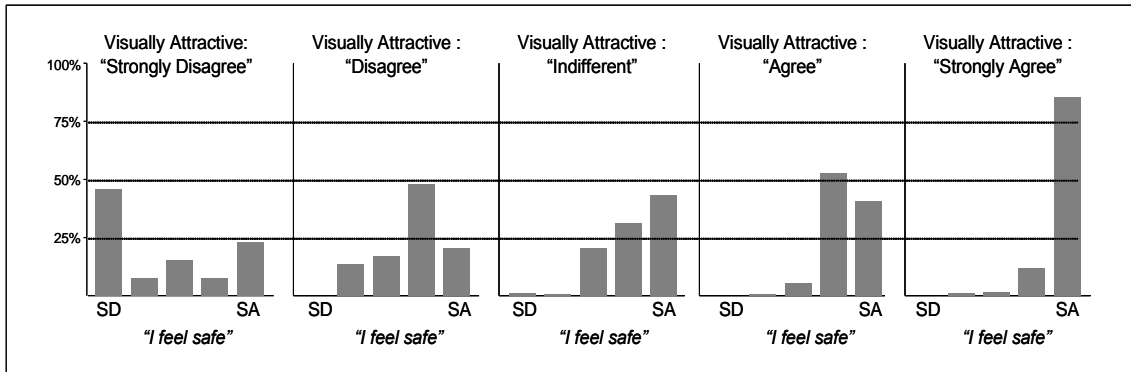


Figure 4. Frequency distributions of SAFETY ratings for various levels of visual attractiveness (*TANGIBLES2*)

To verify the proposed mediation model in Figure 3, we used Baron and Kenny's (1986) procedure and estimated the following equations:

$$SAFETY = \beta_0 + \beta_T TANGIBLES$$

$$BEHAVIOR = \beta_0 + \beta_T TANGIBLES$$

$$BEHAVIOR = \beta_0 + \beta_D TANGIBLES + \beta_S SAFETY$$

Regression Eq Safety-Tangibles	Coefficient (unstandardized)	Std. Error
Constant	2.332***	0.109
Tangibles1	0.506***	0.025
Regression Eq Behavior-Tangibles		
Constant	12.276***	0.651
Tangibles1	2.049***	0.153
Regression Eq Behavior-Tangibles-Safety		
Constant	7.750***	0.765
Tangibles1	1.034***	0.179
Safety	1.977***	0.205

*** 1% significance; ** 5%; and * 10%

Table 4. Results when the independent variable is modernity of equipment

TANGIBLES1 and *TANGIBLES2* measure modernity of equipment and visual attractiveness, respectively. The overlapping variance (i.e., squared correlation) between the two was only 39% (Cronbach's alpha= 0.78). Therefore, we conducted the mediation analyses separately for each variable. Table 4 and Table 5 summarize the results for *TANGIBLES1* and *TANGIBLES2*, respectively.

Regression Eq Safety-Tangibles	Coefficient (unstandardized)	Std. Error
Constant	2.813***	0.109
Tangibles2	0.402***	0.026
Regression Eq Behavior-Tangibles		
Constant	12.647***	0.596
Tangibles2	2.024***	0.143
Regression Eq Behavior-Tangibles-Safety		
Constant	7.170***	0.754
Tangibles2	1.261***	0.152
Safety	1.934***	0.184

*** 1% significance; ** 5%; and * 10%

Table 5. Results when the independent variable is visual attractiveness

The results in both tables, showing all coefficients as being highly significant, strongly support the mediation model. Comparison of the *TANGIBLES* coefficient in the Behavior-Tangibles equation and the Behavior-Tangibles-Safety equation (2.049 vs. 1.034 for *TANGIBLES1* and 2.024 vs. 1.261 for *TANGIBLES2*) shows that the direct effect of tangibles on behavioral intentions declines (though it is still significant) when perceived safety is included as a mediator. This suggests a significant *partial* mediation effect (in both cases the Sobel test was significant at 0.0001 level).

In summary, the findings from our analyses examining the mediating role of perceived safety on the impact of both perceived delays and tangibles on behavioral intentions suggest that customers use observable attributes to make inferences about the soundness of internal operational processes that could affect passenger safety.

5. Conclusion

Perceived safety fully mediates the impact of perceived delay on behavioral intentions (and partially mediates the impact of other observable attributes such as

tangibles). The general lack of publicly available information about airlines' safety records leads customers to look for other "safety cues" during their air travel. Airline companies would do well to pay particular attention to proactively managing such cues so as to reassure customers and strengthen their loyalty. For instance, proactive communications with customers can help avoid misunderstandings about reasons for delays, and providing a pleasant environment during the flight can also enhance customers' trust in the airline.

Observable cues other than delays and the tangibles investigated in the present study may also influence customers' safety perceptions (e.g., the appearance, demeanor and behavior of airline personnel who interact with customers). Investigating the nature and magnitude of the impact of all such cues - and managing those cues accordingly - are also fruitful avenues to pursue for both researchers and managers.

One of our main objectives in this project was to stimulate further work in operations management that takes into account the customers' perspective. It is our hope that our results will provide new insights to researchers designing optimization models for service organizations.

One important area of further research is the coordination of various safety cues. The present paper examined the effect of several cues, but was by no means exhaustive. There are many more tangibles that may -- or may not -- be serving as cues used by customers to make inferences about safety. Another potentially important source of safety cues that was not examined in this paper is the employees' attitudes towards safety. More work needs to be done to investigate the extent to which these perceptions are transferred on to customers and the steps that can be taken to create a culture of safety to ensure that whatever cues are being transmitted are positive.

Another avenue for further research concerns the design of service encounters and customer interfaces. Our study showed that delays can be interpreted as a cue that can lead to inferences about unobservable attributes. As such, the management of delays should be analyzed in the context simultaneously managing multiple cues in order to achieve a given objective. Previous research in this area has found that the various cues can interact with each other, so it is particularly critical for managers to understand the joint effect on customers resulting from the combination of delays with the various other cues present in the service interface.

This paper also brings to the surface a number of relevant research questions from the behavioral perspective. First, there is the opportunity for further work connecting internal and external perceptions of safety. It would be useful, for example, to study several airlines to analyze the extent to which various internal safety metrics correlate with the customers' safety perceptions. Second, more research is needed to examine the role of affect and mood in perceptions of safety. It is well-established in the psychology literature that mood significantly affects estimates of risk and undesirable events and flight delays have been shown to affect customers' emotions. Thus, it is possible, for example, that uncertainty and anger mediate the impact of delays on perceived safety. A deeper understanding of these issues would permit the development of more effective perceptions management techniques.

Appendix: Questionnaire items

To measure perceptions of delay, we included the question below, which was answered on a binary (yes/no) scale:

- *DELAY*: Did your flight depart on time?

This item was dummy-coded so that if the answer was yes $DELAY=0$ and if the answer was no $DELAY=1$,

To measure perceived safety, we added the following question:

- *SAFETY*: I feel safe flying with Airline

Responses to this item were on a 5-point scale, with extreme points labeled as strongly disagree and strongly agree.

Behavioral Intentions were measured with a five-item scale developed by Zeithaml et al. (1996). Responses to the five *BI* items were on a 5-point scale with the anchors labeled as very unlikely and very likely.

- *BI1*: Say positive things about Airline to other people
- *BI2*: Recommend Airline to someone who seeks your advice
- *BI3*: Encourage friends and relatives to do business with Airline
- *BI4*: Consider Airline your first choice for an airline
- *BI5*: Do more business with Airline in the next few years

Next, we included two questions about control based on the studies of Folkes et al. (1987) and Taylor (1994).

- *CONTROL1*: Airline could have done something to shorten the delay
- *CONTROL2*: There was nothing Airline could have done to prevent the delay

The *CONTROL* items were answered on a 5-point scale with anchors strongly disagree and strongly agree.

We included two items about the tangibles dimension of service quality from the SERVQUAL scale (Parasuraman et al. 1988):

- *TANGIBLES1*: Airline has modern equipment
- *TANGIBLES2*: Airline's airplanes are visually attractive

Both *TANGIBLES* items were answered on a 5-point scale with anchors labeled strongly disagree and strongly agree.

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Journal of Airline and Airport Management, 2012 - www.jairm.org

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Scholar Sponsorship: [Universitat Politècnica de Catalunya. BarcelonaTech](http://www.upc.edu)