BOOK REVIEW

Oum, T. H., & Yu, C. (1997). *Winning airlines: Productivity and cost competitiveness of the world's major airlines.* Boston: Kluwer Academic Publishers. 212 pages.

Reviewed by Michaela M. Schaaf, University of Nebraska at Omaha

Winning Airlines is sixth in a seven volume series entitled 'Transportation Research, Economics and Policy,' published by Kluwer Academic Publishers. The title of this specific volume by Tae Hoon Oum and Chunyan Yu is appropriate as the authors present the environment and statistics surrounding productivity and cost competitiveness of select world airlines. The book is organized similar to a research article, befitting of the targeted academic audience familiar with the information flow of an academic article.

Winning Airlines provides a systematic analysis of airline cost competitiveness, examining the "supply side of air transport services, where airline management has considerable control" (p. 2). Oum and Yu cite this as possibly the most important determinant for success in a company. Central to the understanding of the book, Oum and Yu define an airline as cost competitive if "unit costs are consistently lower than that of competitors" (p. 1). In order to accomplish this task, Oum and Yu collaborated on four years of airline industry research, the results of which are reflected in this book. The authors also note that their methodologies are not limited to the airline industry, but could find applicability in other fields as well.

Oum and Yu have extensive qualifications in the field to appropriately handle productivity and cost competitiveness of airlines. Dr. Tae Hoon Oum is Van-Dusen Professor of the Management Division of Transportation, Logistics and Public Utilities at the University of British Columbia, Vancouver. According to Oum's vita, his research interests are centered in regulatory and industry policy analysis, demand modeling and forecasting, and cost and productivity analysis. Recently, Oum has focused his research efforts on airline policy issues including open skies and globalization of airline networks, both of which are presented in *Winning Airlines*. Dr. Chunyan Yu is a post-doctoral research associate on the same faculty as Oum at the University of British Columbia. Her expertise in productivity and efficiency analysis are evident in *Winning Airlines*. She is also published in the area of rail and air transportation.

The authors begin by reviewing historical trends in international air traffic growth and illustrating the correlation between the world economy and these air traffic levels. Since the first international airline alliance in 1986, airlines have

rushed to establish alliances in order to better their stake in the competitive global air transport market. Oum and Yu predict the air transport industry is moving towards global airlines or global service networks as the cost savings and commercial benefits of such networks cannot be overlooked.

Competitiveness in the air transport industry is defined by the regulatory environment in which it operates. This regulatory environment includes an extensive network of government bilateral and multilateral agreements, the Chicago Convention of 1944, and IATA rules. The regulatory environment in North America has seen changes over the past twenty years. While the United States has increased competition through deregulation and open skies agreements, Canada has proceeded guardedly with respect to competition. The government owned carriers which once dominated the heavily regulated European market were being challenged by charter services in the 1960s and 1970s, thereby creating the need for changes in the regulatory environment. The creation of the European Community made it "the world's largest single aviation market with more than 370 million potential passengers" (p. 27). Meanwhile, the Asia-Pacific market is slower to deregulate than North America and Europe. However, through the privatization of many previously government operated airlines, the Asia-Pacific market is making progress. Oum and Yu review this significant region country by country as it is the "fastest growing air market in the world" (p. 28).

Oum and Yu selected a sample of 22 international air transport carriers to study environment and input prices. "A primary determinant of the cost of providing airline services is input prices, that is, prices per unit of [labor], fuel, aircraft and infrastructure services, as well as purchased materials and services" (p. 42). Oum and Yu provide input efficiency results in chapter five. Airline input efficiency is used to compare efficiency among airlines, while accounting for uncontrollable variables beyond airline managerial control. Oum and Yu cite two such uncontrollable variables: average stage length and composition of airline outputs. They attempt to create a baseline by removing these uncontrollable variables. However, discrepancy still exists over whether or not load factor and aircraft choice are controllable or uncontrollable variables.

After introducing some additional measurement methodologies, Oum and Yu begin to tie individual chapters of the book together in chapter six. Total factor productivity (TFP), is used to measure and compare productivity of all input factors. "TFP is defined as the amount of aggregate output produced by a unit of aggregate input" (p. 93). Results indicate most airlines improved their gross TFP levels during the period studied (1986-1995). "Productivity of a production unit refers to the ratio of its output to input" (p. 77). Labor, fuel, materials, flight equipment, and ground property and equipment constitute the categories of input, while output categories consist of scheduled passenger service, scheduled freight service, mail service, non-scheduled passenger and freight services, and incidental services. Oum and Yu infer European improvement is due to European Community regulatory and institutional changes since 1986. They propose

that the decline in TFP from 1990 to 1992 may be due to the Gulf War economic recession. The residual TFP results of Oum and Yu indicate European carriers have enjoyed better growth in efficiency than American carriers. Furthermore, the results suggest the sample carriers exhibit a great deal of efficiency.

Oum and Yu state economic theory fails to provide "unequivocal propositions" on the question of whether or not government ownership impacts efficiency. Principal-agent theory maintains that government ownership is less efficient than private organizations. Oum and Yu contend this is based upon fewer managerial incentives and inadequate monitoring arrangements. Additional problems commonly associated with government ownership include over-capitalization, lower productivity, high wages, and partiality for business rather than consumer groups. Others contend that the same problems associated with principal-agent theory can arise in the private sector as well. Oum and Yu, in an attempt to resolve the debate, conduct a one-way analysis of variance (ANOVA) using residual TFP scores and the stochastic frontier model. The ANOVA results indicate majority government ownership has a "statistically significant negative effect on airline efficiency," ranging from 3 to 13 percent difference in terms of average efficiency between airlines (p. 113). Airline management should note that airline involvement in incidental businesses proved to have higher productive efficiency than those airlines not engaged in incidental businesses.

Before Oum and Yu can make their final cost competitiveness comparisons, they introduce supplementary material regarding airline cost structure. This data helps to lay the groundwork for subsequent, concluding chapters. The supplementary material introduced include capital cost shares, which have risen slightly since 1993; "an upward trend in materials cost shares...supported by growing of outsourcing/global sourcing activities" (p. 137); and unit costs in terms of cost competitiveness, where Oum and Yu identify 1200 km as the average stage length where cost effectiveness is expended. The analysis of stage length in relation to unit cost is insightful and thorough. Noting a specific point at which unit cost and stage length positively or negatively affect airline economics will assist airline management.

Next, Oum and Yu identify sources of airline cost competitiveness. Specifically, an airline is cost competitive if it sustains lower unit costs (average costs) than that of its competitors. This can be accomplished through better efficiency, lower input costs, or both. Oum and Yu contend "observed unit cost differences do not reflect true comparative cost competitiveness between the airlines, as airlines have different operating and network characteristics" (p. 160). A cost competitiveness indicator, as defined by Oum and Yu, sums input price effects and efficiency effects. The "indicator approximates the 'true' comparative cost competitiveness of airlines" (p. 162).

Throughout the book the reader anticipates Oum and Yu sharing their expertise in analyzing the data provided. Oum and Yu succinctly relay in one paragraph the practical meaning of previous chapters. The authors predict efficiency

will become more important in the future as global outsourcing becomes more prevalent. Emphasis on input prices, so important in the past, will be minimized as control over these variables is beyond the airlines.

The final chapter is a review of the previous nine chapters where Oum and Yu restate the brief analyses made in earlier chapters and present conclusions of the research. It is in this last chapter that the authors mention the absence of South American carriers in the sample. The authors state, with regret, they could not compile the reliable and systematic data for the South American carriers.

The general impression of *Winning Airlines* leaves the reader considering the past trends and industry predictions offered by Oum and Yu. This book applies economic theory to airline industry data. *Winning Airlines* targets an audience familiar with the framework in which the air transport industry operates. The new aviation reader may struggle with the terminology and understanding of the airline environment. Therefore, aviation administration knowledge is helpful in analyzing some of the data provided. Faculty and graduate students in aviation, transportation, planning, and economics, and readers of the *Journal of Air Transportation World Wide* will appreciate the content of *Winning Airlines*. This volume commands a high price at $95 (U.S.), however the research contained herein is a must for all economics and transportation faculty and libraries. Faculty and graduate students will find the research has theoretical implications, while the air transport industry will appreciate the practical applicability.

Winning Airlines takes a quantitative and financial approach to evaluate airlines. Data is cited, while figures and tables abound. Oum and Yu provide a resourceful book which examines the issues relating to productivity; input prices; exchange rate dynamics; global sourcing of airline labor, maintenance, and other services; and unit cost competitiveness of the airlines.

Beaty, D. (1995). *The Naked Pilot: The Human Factor in Aircraft Accidents*. London, England: Airlift Publishing Ltd. Pp. 310. ISBN 185104825. $U.S. 19.95 Soft-cover.

Reviewed by Karisa Kane, University of Nebraska at Omaha

The Naked Pilot is a superior book for anyone interested in why human error causes aircraft accidents. The author, David Beaty, explores many different realms of human factors in the twenty chapters of the book. Topics such as the male ego, decision-making, boredom and absence of mind, human factors in management, communication, and conformity are discussed. The book is written at a level the average person could understand, but at the same time still manages to educate those knowledgeable in the aviation industry and in human factors. Beaty, a former RAF pilot, airline pilot, historian, Foreign Office principal, psychologist and author is amply qualified to speak on the subject.

Chapter One delves into the history of human error dating back to the evolution of humankind. With the explosion of technology, never has it been so important as now to understand why humans make mistakes and to try to combat these mistakes. Several major disasters, Three Mile Island, Tenerife, and Chernobyl, have brought about the urgent need to study man's mistakes in his technical environment.

In Chapter Three, Beaty labels human error as the last great frontier in aviation. The concept of pilot error is explored here. Beaty argues the term human error is an unfair and inaccurate statement for two reasons; 1) an indecent haste people feel to attribute the accident to something or someone and 2) the implicit belief that flying as a skill is very difficult.

Since the beginning of time, man has always felt the need to blame someone, a scapegoat, when something goes terribly wrong. We need somewhere to place our blame and anger when something bad occurs. The second reason is no longer true today as very few accidents are actually a result of errors in flying skill. With the advent of simulators and training programs piloting errors have become rare. However, the pilot is just as susceptible to the human condition as anyone else and most accidents are a result of human error and not piloting error.

Since the evolution of humankind, communications have become ever more complex. Beaty argues that our society has been losing the ability to communicate. Evolution has taught us that humans have a mistrust of strangers and it takes time to warm up to new people. Even if the pilots are in a situation in which they know each other, their personalities may be antipathetic. Evidence of this can be seen in many airline accidents including Air Florida (1982) in which the anti-ice was not turned on while attempting to take off in icing conditions. The 737 crashed upon take-off into the Potomac River in Washington, D.C. Incredibly, as the copilot called off the start checklist the captain answered "off" to anti-ice despite the fact the 737's wings were covered by ice and snow. The "off" response was never challenged by the copilot perhaps due to stress and time pressure, and communications broke down at a critical moment.

Beaty describes a phenomenon known as the "deadly set" in Chapter Four. It is described as a set of survival characteristics humans have inherited that predisposes us to select our environment. During an event, the human focus tends to fix on that part of the picture that is paramount at the time and ignore the rest of the environment. Pilots in the cockpit must constantly scan the environment and keep the balance between too much visual stimuli and too little. German psychologists have recognized the dangers in this "deadly set" or pattern way of thinking. Within all of us is the tendency to see things in a certain way while ignoring all other interpretations. Flight training takes advantage of these sets during training. A pilot learns a series of sets in flying maneuvers such as engine failures. Many aviation accidents can be attributed to this phenomenon including a crash landing in Orlando, Florida by a crew flying a DC-8. The crew had been alerted to traffic in the area and their attention was focused on looking for the traffic, especially since they had just canceled Instrument Flight Rules (IFR)

and were looking to see and avoid. Meanwhile, they began their initial decent by throttling back the engines. This reduction in power sounded the landing-gear horn telling them the undercarriage was not down. In order to continue looking for traffic in the area and to not be distracted by the horn, they turned off the warning. The landing gear was forgotten due to the crews engrossment in looking for traffic. Subsequently, they landed on the runway with their undercarriage up causing considerable damage to the aircraft.

Beaty describes the male ego in Chapter Eight as a double-edged sword. An important part of anyone's identity is how he or she regards themselves, their place in society, and their attainments. Robbie Burns wrote that mankind needs to have a "guid conceit of himself." Freud described three parts of the man's psyche: the id, or subconscious, the ego, and the superego. Sometimes the ego grows to be over developed and inflated. This can be very dangerous in the flight environment. Flying has historically been called macho and a study showed that both men and women exhibit active-masculine personalities. One of the most infamous aviation accidents in history illustrates this notion perfectly; Tenerife. Anyone involved in aviation human factors knows the events that occurred on the island of Tenerife that cause the world's worst aviation accident. On March 27, 1977, a bomb exploded at Las Palmas airport and the airport was closed to all traffic. Two Boeing 747 aircraft (KLM and Pan Am) were told they could not land and were diverted to Tenerife as were most other aircraft. The elements of fatigue, uncertainty, and frustration were adding to a crowded airport. The KLM captain was the airline's chief flight instructor and was a man of considerable prestige in the company. His copilot had been certified by him in the 747. The Las Palmas airport opened and the Pan Am was ready for departure but found the KLM aircraft blocking the runway. The KLM moved up the runway with Pan Am following behind. The weather began to deteriorate with low clouds rolling in. KLM requested a backtrack down the runway and was to make a 180 degree turn to face the take-off direction. The Pan Am had also been cleared to backtrack down the same runway. The KLM captain was anxious to take off and probably had his expiring flight crew duty time in the back of his mind. The captain began to move the throttles as the copilot objected. The captain told the copilot to go ahead and ask for ATC clearance. As the copilot was still trying to get clearance, the captain started the take-off. The Pan Am 747 was still taxiing back up the runway as the KLM began its take-off roll. The KLM flight engineer called out that he did not think the Pan Am was clear of the runway after listening to the radio transmissions from Pan Am to ATC. He was confident the KLM did not have the proper clearance and had two options: question the captain or take action himself by shutting down the throttles and braking. Unfortunately, he chose to challenge the captain's decision while the take-off roll was occurring and it was now too late as "Vee One" was called out. The crew of Pan Am saw the KLM's landing lights through the low clouds and realized they were directly in the path of the oncoming aircraft. No one on board the KLM 747 survived and 235 died on the Pan Am 747.

The copilot of the KLM had doubts about the ATC clearance as did the flight engineer but neither one was able to overcome the captain's ego. Had the flight engineer seen any signs of support from the copilot he would have taken action. The copilot gave in to the captain's impatience to take off and his authority. No other profession is tested and challenged as often as that of a pilot. A pilot must routinely go through medical and flight checks and at any time he or she may lose their licence and their livelihood.

Beaty launches into a discussion of decision-making in Chapter Nine. An analysis of a 1977 FAA report over a four-year period showed that 50 percent of errors in judgements by pilots resulted in more than 50 percent of pilot fatalities. Pilots are routinely confronted with making decisions in a critical time environment. Not only does the pilot have to make the correct decision they also have to execute it correctly. Often the wrong decision is made and there is a tendency to stick to it through thick and thin "...because unpicking a decision is even more difficult and stressful and in some instances damaging to the person's ego" (p. 93). Psychologists have become interested in decision theory. Our ancestors developed instincts and reflexes as a basic necessity for biological and sociological survival. Pilots also learn skills and reflexes so they become highly resistant to wrong moves. However, under stress or fatigue these skill sequences may become highly disorganized. A pilot goes through many steps before he or she arrives at a decision. First, the pilot must weight the input from many information sources to understand the situation. With all of the input information, the pilot must make an assessment of all of the alternatives available from which to choose. The pro's and con's of each alternative must be weighed along with the expected outcomes. Beaty argues that one of the most important factors in decision-making is the degree of arousal involved when making a decision. Psychological research shows that under high arousal conditions, pilot thinking becomes more rigid and there is a tendency to stereotype decision-making. Extremes of arousal, whether they are very high or very low, tend to reduce the possibility of making a rational decision. Most situations encountered by a pilot are fraught with extreme arousals resulting in decision-making that is less rational. This could explain Air Florida's (1982) crash into the Potomac. Several wrong decisions were made including thinking the snow and ice on the wings were not a problem. Only at the last possible moment did the crew apply full power in an attempt to pull up and by then it was much too late.

Chapter Twelve delves into the issues of automation that Beaty argues causes boredom and absence of mind. Automation has come with a price tag. There is no doubt that automation has increased aviation safety. Ground proximity warning systems have dramatically decreased the number of controlled flight into terrain (CFIT) accidents from thirty-three in 1969 to eight in 1984. Beaty argues that automation has come at the price of loss of proficiency of pilots. A skill loss has been detected in pilots who regularly use automation. A natural human reaction to not enough stimuli is boredom and this holds true for pilots who are not sufficiently stimulated in the cockpit. An alarming example of this boredom can

been seen in a 1988 Brazilian crash landing. The pilot, bored on a one hour flight from Maraba to Belem, asked the control tower how he could tune in the football match between Brazil and Chile. Completely engrossed in the football match, the pilot failed to set the autopilot correctly and put the plane on a southerly course rather than a northerly one. The pilot lost contact with Belem and was forced to crash land in dense jungle. The trees sliced off the aircraft's wings and crumbled the fuselage. Luckily, forty-three passengers survived. Rescuers reported that the first words out of the pilot's mouth after hacking his way out of the jungle was, "Who won?" (p. 133).

Beaty describes conformity as the "three headed hydra" in Chapter Thirteen. "The first head is obedience to a possibly mistaken authority, the second is going along with other people's views rather than one's own, and the third is the excessive desire to please" (p. 148). Blind obedience can be seen throughout the world in Nazi Germany and Soviet Russia in which people obeyed authority figures to a great extent and beyond what would be expected. An application of blind obedience to a mistaken authority can be seen in a 1956 Comet accident in Rome. The Comet training manual specified the take-off of the Comet's nose wheel at 80 knots. The captain obeyed the manual and attempted to take-off at a speed above 80 knots. Instead of rising, the Comet came back down on the runway. The aircraft would not fly so the captain in an attempt to save his aircraft and crew made an abrupt stop at the end of the runway. The plane was seriously damaged and yet the pilot obeyed the manual to the letter. In our society it is essential that we obey, otherwise chaos would erupt, but there is a hidden danger in blind obedience.

The second type of conformity is going along with another person's views although they are not in agreement with their own. A psychological experiment by Asch (1956) in which the task was to judge which of three lines—one of six and a quarter inches, one of six and three-quarter inches, and one of eight inches—was equal in length to the standard line of eight inches. There were nine subjects, eight of whom were 'in the know'. These subjects gave their answers first and all unanimously chose the six-and-a-quarter inch line as equal to the eight inch line. The last subject, faced with a group who had all unanimously chosen one answer, conformed to the group pressure and chose the six-and-a-quarter inch line as well. The experiment was repeated several times and 37 percent of the naive subjects gave into the group decision.

The third type of conformity, the desire to please, is a greater menace than the other two types because it wears such a benign face. In 1966, a B-707 was almost twenty hours late for a flight from Tokyo to Hong Kong. The pilot possibly trying to please his passengers for the substantial delay decided to change his flight plan to climb over Fuji rather than to the south of it. The dangerous turbulence from high winds over mountains is well known and neither the crew nor operations had informed the weather service of their intentions to fly toward Fuji. A passenger with an eight-millimeter film had recorded the fateful flight and pictures of upside-down passenger seats and torn carpet were taped. The B-707 had

disintegrated in flight. The National Transportation Safety Board gave the possible cause as "the aircraft suddenly encountered gust loads exceeding the design limit and disintegrated in air in a very short period of time." The NTSB added that it was thought the climb over Fuji may have been attributed to the pilot's desire to please his restless passengers by giving them a better view of Fuji.

Beaty's many other chapters in the book such as: to see and not to see; being deceived; learning and regression; fatigue and stress; and human factor education, make this a well-rounded book on human factors. Beaty's book is by far one of the best books on the subject and I have referenced it repeatedly.