

Fall 1995

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Scholarly Commons Citation

Stolzer, A. J. (1995). Study of Demand for Light, Primary Training Aircraft in Collegiate Aviation. *Journal of Aviation/Aerospace Education & Research*, 6(1). <https://doi.org/10.15394/jaaer.1995.1165>

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***STUDY OF DEMAND FOR LIGHT, PRIMARY TRAINING AIRCRAFT
IN COLLEGIATE AVIATION***

Alan J. Stolzer

Virtually no light, primary training airplanes are being produced in the United States. An exploratory study was undertaken to establish the demand for U.S.-produced light, primary training airplanes in collegiate aviation programs. The study involved both two- and four-year institutions of higher education that offer aviation programs. Data were collected from 24 randomly selected educational institutions by means of a brief questionnaire. An analysis of the data was performed to predict the demand for these airplanes. It was concluded that additional aircraft are needed to satisfy the demand.

In the past, many schools purchased new airplanes, flew them for approximately 3,000 hours, then replaced their fleets with new ones. Early replacement of the airplanes ensured that the school had clean, aesthetically appealing trainers, and let the school avoid the maintenance and airworthiness factors associated with operating older airplanes. However, with the lack of available training planes, flight school operators and others are flying these aircraft much longer, or are turning to foreign manufacturers for their aircraft.

Several years ago, many aircraft manufacturers were producing a large number of light, primary training aircraft. Today, almost no two-seat aircraft of this type are being produced. The lack of new, U.S.-built, primary training aircraft threatens the flight training industry's ability to meet the global demand for pilots and underscores a major shift toward foreign dominance of a market that had been the undisputed domain of American light aircraft manufacturers (Phillips, 1992). Many industry experts assert that the United States must revive its general aviation industry by manufacturing these aircraft. In a 1993 report prepared by a federal advisory committee, it was recommended that U.S. manufacturers begin to produce reasonably priced training aircraft (Federal Aviation Administration [FAA], 1993).

PURPOSE OF THE STUDY

The purpose of the study was to investigate the future demand in collegiate aviation programs for light, primary training aircraft manufactured in the United States. For

this study, light, primary training aircraft was defined as non-military, single piston-engine, propeller-driven, non-complex airplanes.

INDUSTRY BACKGROUND

Aircraft Production

According to Edward Stimpson, former president of the General Aviation Manufacturing Association (GAMA), the average age of single-engine airplanes in the United States is 27 years, and one-third of the U.S. fleet is more than 32 years old (Stimpson, 1993). Cessna Aircraft Company, once the world's largest supplier of general aviation piston aircraft, has not produced an aircraft in this category since 1985. This fact is in contrast to Cessna's production numbers from 1959 to 1985 of just two of its models, the 150/152 series and the 172, which totaled 31,340 and 33,629 units, respectively (Davisson, 1989; McClellan, 1992).

During the past decade, a precipitous drop has occurred in both the number of manufacturers and the number of units produced in this country. In 1980, there were 29 manufacturers of piston aircraft in the United States and 15 foreign manufacturers. In 1992 there were nine U.S. manufacturers and 29 foreign manufacturers of piston aircraft. In 1978 U.S. manufacturers produced 18,000 units. In 1992 only 899 units were produced, an all-time low (Glickman, 1993). Of the 18,000 piston-powered aircraft produced in 1978, 14,400 were single-engine aircraft (Gormley, 1991). According to GAMA, the number of single engine, piston-powered aircraft delivered has declined 92.3% during the past decade

Study of Demand

Table 1
Primary Trainer Production Satisfying Demand
n=23

| Variable | Frequency (%) |
|----------|---------------|
| Yes | 1 (4.3) |
| No | 22 (95.7) |

(Phillips, 1990).

Pilot Demand

A major factor influencing the demand for light, primary training aircraft is the demand for pilots. It is predicted that 161,050 total new-hire pilots will be employed between 1993 and 2004, for an average of 13,420 per year (FAA, 1993). These pilots will come predominantly from the civilian sector. Although military-trained pilots have historically satisfied up to 85% of the air carrier flight crewmember hiring demand, the availability of military-trained pilots has been and will continue to be reduced because of the restructuring of U.S. military forces. In fact, all of the military services combined will train fewer than 2,000 fixed-wing pilots each year through 1997 (FAA, 1993). Thus, pilots from the civilian sector will account for approximately 85% of the hiring demand for the next several years.

METHOD

Subjects

Subjects for this study were selected from a single population, higher education institutions offering flight education programs as listed in the *Collegiate Aviation Guide*, a reference guide of collegiate aviation programs published by the University Aviation Association (UAA) (1994). Using a random number generator program, 40 institutions were selected from the population of 146 institutions offering programs in flight education. The selected subjects were mailed

an 11-item questionnaire specifically designed for this study.

RESULTS

Twenty-four of the 40 subjects returned the questionnaire. Thus, data were collected from 16.44% of the population of 146 institutions. The data are presented in the following six tables. The numbers in parentheses in the frequency columns indicate the percentage of the total return for that item. In some tables, the totals of the percentages do not equal 100.0% due to rounding. SD is used in some tables; SD = standard deviation.

The primary objective of this study was to determine whether a demand exists for U.S.-produced light, primary trainers in collegiate aviation programs. Data were collected to determine that a demand exists for these aircraft (Table 1), to quantify the demand (Table 2), and to ascertain the respondents' preference for U.S.-manufactured trainers (Table 3).

Table 1 shows a summary of whether the respondents believe that a sufficient number of new airplanes is being produced to satisfy the actual demand for them.

More than 95% of the respondents indicated that there is not sufficient production of these aircraft to satisfy the demand.

The respondents were asked to indicate their estimate of the national demand for primary training aircraft in one year, five years, and 10 years, given the availability of suitable airplanes at a reasonable cost. A summary of the data gathered is shown in Table 2.

Table 2
Estimate of National Demand for Primary Trainers in 1 Year, 5 Years, and 10 Years

| | 1 year n=8 | 5 years n=8 | 10 years n=6 |
|---------|---------------|----------------|-----------------|
| Minimum | 200.00 | 500.00 | 1,500.00 |
| Maximum | 10,000.00 | 75,000.00 | 150,000.00 |
| Range | 9,800.00 | 74,500.00 | 148,500.00 |
| Mean | 3,378.75 | 16,012.50 | 42,583.33 |
| SD | 3,909.28 | 24,780.20 | 55,532.35 |
| Median | 1,715.00 | 8,500.00 | 18,000.00 |

Table 3
Desire for Primary Trainers to be U.S. Produced
n=24

| Variable | Frequency (%) |
|-----------------|---------------|
| Strongly prefer | 16 (66.7) |
| Prefer | 8 (33.3) |
| No preference | 0 (0.0) |

It should be noted that a relatively small number of the subjects responded to this question. As the table indicates, only one-fourth of the respondents (n = 6) estimated the national demand for these airplanes in 10 years. This finding approximates that from the 1991 National Training Aircraft Symposium, where only one-third of the educators surveyed responded to a similar question on national demand (Brady, 1991).

The respondents were asked to indicate their preference that the airplane they purchase was manufactured in the United States. Those preferences are summarized in Table 3.

The data clearly suggest a desire by the respondents to purchase a U.S.-built product. Every respondent indicated a preference to purchase U.S.-manufactured airplanes, and two-thirds of the respondents indicated that this was a strong preference.

In addition to the data collected regarding the respondents' estimate of the demand for the airplanes and their preference for whether the airplanes are produced in the United States or elsewhere, additional data were collected on the respondents' preferences

Table 5
Desired Number of Seats
n=19*

| Variable | Frequency (%) |
|------------|---------------|
| Two-seats | 12 (63.2) |
| Four-seats | 7 (36.9) |

* Five respondents indicated they desired both two- and four-seat primary trainers.

Table 4
Desired Wing Configuration
n=24

| Variable | Frequency (%) |
|---------------|---------------|
| High wing | 14 (58.3) |
| Low wing | 3 (12.5) |
| No preference | 7 (29.2) |

about some of the characteristics of the trainer.

The respondents were asked to indicate their preference of wing configuration (high or low) for the primary trainer. Those preferences are summarized in Table 4.

Nearly 60% of the respondents indicated a preference for a high-wing trainer, approximately 12% preferred a low-wing trainer and the remaining nearly 30% had no preference. Thus, given that the respondents who indicated that they had no preference would be satisfied with either, it could be said that a high-wing primary trainer would satisfy approximately 90% of the respondents and a low-wing airplane would satisfy approximately 40% of the respondents.

The respondents were asked to indicate their preference of number of seats. Those preferences are summarized in Table 5.

More than 60% of the respondents indicated that they preferred two-seat primary trainers.

Table 6
Price Institution Would Pay (VFR)
n=22*

| Variable | Frequency (%) |
|--------------------|---------------|
| \$50,000-\$69,000 | 17 (77.3) |
| \$70,000-\$89,000 | 4 (18.2) |
| \$90,000-\$109,000 | 1 (4.5) |
| \$110,000+ | 0 (0.0) |

* One respondent indicated that \$25,000 to \$30,000 would be a reasonable price for the aircraft.

Study of Demand

The respondents were asked to indicate the price their institutions would be willing to pay for a visual flight rules (VFR)-equipped airplane. A summary of the data gathered is shown in Table 6.

The mean price that all of the respondents (including the noted respondent) were willing to pay is \$63,326.09. Fewer than 5% of the respondents indicated a willingness to pay \$90,000 or more for the aircraft. A large disparity seems to exist between the mean price the respondents were willing to pay and the advertised prices of most new airplanes.

Of the 24 respondents, eight represented two-year schools and 16 represented four-year schools. A *t* test for independent samples ($\alpha = .05$) was used to compare the responses of the subjects representing two-year institutions and those representing four-year schools to determine whether there was a significant difference between the two subgroups. First, the *t* test was used on the data gathered regarding the number of airplanes operated by each of the two subgroups. Representatives of institutions that offer flight training through contracted providers were instructed to consider as their own the airplanes dedicated to the institutions' use. It was found that there was no significant difference between the number of airplanes operated by the subjects representing two-year schools and those representing four-year schools, $t(22, N = 24) = 0.777, p < .05$. Next, the *t* test was used on the data gathered regarding the prices the respondents in each of the two subgroups were willing to pay for these airplanes. Again, it was found that there was no significant difference between the price the two-year schools and the four-year schools were willing to pay for the primary trainer, $t(21, N = 23) = -1.412, p < .05$.

DISCUSSION

This study surveyed educators in colleges and universities offering aviation programs to determine whether a demand exists for additional primary training aircraft. The results of this study indicate that an increased number of domestically produced, light, primary training aircraft are needed by educational institutions to satisfy the demand for these aircraft.

Nearly every respondent (23 out of 24) indicated that more aircraft are needed to meet the demand. In

addition, nearly 70% of the respondents indicated that they would "strongly prefer" (all remaining respondents indicated that they would "prefer") that the airplanes be manufactured domestically. These data show a strong sentiment among the respondents to purchase U.S.-produced trainers.

Several other interesting points were noted during this study. One is the price the respondents were willing to pay for a light, primary trainer. Four choices were offered on the questionnaire, ranging from \$50,000 to more than \$110,000. The majority (77.3%) selected the lowest cost category offered, one respondent wrote in a lower cost category than was offered, and there were numerous comments submitted on the questionnaire regarding the cost of these aircraft. It must be concluded that the trainer's purchase price is a major concern to the respondents. Several respondents indicated that it should be possible to produce a light, primary trainer for well under \$50,000, although no specific suggestions about how this could be accomplished were offered. One respondent used an analogy of automobile production and commented that a light, training aircraft should cost no more than a mid-priced minivan.

Frequently, flight education programs at two-year schools are perceived as smaller and underfunded than programs at four-year institutions. T-tests were used in this study to compare two-year and four-year institutions with respect to the sizes of their fleets and the prices the institutions were willing to pay for a trainer. Although the differences were not statistically significant, the two-year institutions operated larger average fleet sizes than those of the four-year schools (18.00 versus 12.56), and were willing to pay only slightly less for a trainer (\$58,312.50 versus \$66,166.00).

This study was constructed to determine whether an unsatisfied demand exists. Because the study was conducted nationally and had a 60% return rate, the results can be generalized to a similar population.

Few observers would disagree that the availability of primary training aircraft is central to general aviation's future. Yet, while there is much commentary on the subject, little research is being done. It is hoped that additional studies will be conducted on the subject of primary training aircraft. Some suggestions for further

research might include:

1. Determining the anticipated demand for these aircraft in the years ahead. This study determined that there is a demand. The logical next question is, how great is the demand?
2. Examining the causes for the lack of production

of primary trainers and exploring possible solutions to these problems.

3. Determining the features and characteristics of a primary trainer most needed and desired by the users of these aircraft.□

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