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An Airline Ab Initio Flight Training Program in the United Arab Emirates (UAE): An Analytical Approach toward Emiratization

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AN AIRLINE AB INITIO FLIGHT TRAINING PROGRAM IN THE UNITED ARAB EMIRATES (UAE) AN ANALYTICAL APPROACH TOWARD EMIRATIZATION

by

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This Thesis was prepared under the direction of the candidate's Thesis Committee Chair, Dr. Thomas R. Weitzel, Associate Professor, Daytona Beach Campus, and the Thesis Committee Members, Dr. David Esser, Professor, Daytona Beach Campus, and Ms. Michele Summers, Assistant Professor, Daytona Beach Campus, and has been approved by the Thesis committee. It was submitted to the Department of Applied Aviation Sciences in partial fulfillment of the requirements for the Degree of Master of Science in Aeronautics.

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ABSTRACT

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The continuous establishment and expansion of UAE airlines has led to a demand for qualified pilots in the region of the Persian Gulf The shortage of UAE national pilots has compelled the local airlines to employ pilots with foreign nationalities Though the UAE government has implemented a program within the Emirates to increase the number of nationals in the work force (referred to as Emiratization), there has been little headway within the aviation sector As a result, this thesis was undertaken to develop an ab initio training program that would increase the percentage of UAE nationals among the UAE airline pilots' population The project has fallen within the guidelines of some U S voluntary programs, such as the Advanced Qualification Program (AQP) and the FAA/Industry Training Standards (FITS) The analysis of data acquired from an airline's ab initio program has aided in a new proposal for flight training in the UAE

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LIST OF ACRONYMS

AB	Aeronautics Branch
ADCAD	Abu-Dhabi Civil Aviation Department
ADIA	Abu-Dhabi International Airport
ADM	Aeronautical Decision Making
AFP	Airport Familiarization Program
AIFA	Al-Ain International Flight Academy
AIM	Aeronautical Information Manual
AMS	Air Mail Service
AP	Auto Pilot
APR	Approach
AQP	Advanced Qualification Program
ASAP	Aviation Safety Action Program
ATC	Air Traffic Control
CAA	Civil Aeronautics Authority
CBT	Computer Based Training
CFI	Certified Flight Instructor
CFII	Certified Flight Instructor-Instrument
CFR	Code of Federal Regulations
CIA	Central Intelligence Agency
CMAQ	Cockpit Management Attitude Questionnaire

CPL	Commercial Pilot License
CRM	Crew Resource Management
DOD	Department of Transportation
DE	Designated Examiner
EAA	Experimental Aircraft Association
ERAU	Embry-Riddle Aeronautical University
ERT	Extended Review Team
FAA	Federal Aviation Administration
FALFA	FITS, AQP, LOSA, FOQA, and ASAP
FAR	Federal Aviation Regulation
FFS	Full Flight Simulator
FITS	FAA/Industry Training Standards
FO	First Officer
FOQA	Flight Operational Quality Assurance
FTD	Flight Training Device
GA	General Aviation
GCAA	General Civil Aviation Authority
GPS	Global Positioning System
I & O	Implementation and Operations
I/E	Instructor/Evaluator
IPO	Input-Process-Outcome Model
IR	Instrument Rating
ISD	Instructional Systems Development

JTA	Job Task Analysis
LDG	Landing
LOFT	Line Oriented Flight Training
LOSA	Line Operations Safety Audit
LTG	Line Training Guideline
LTR	Line Training Records
MCT	Multi-Crew Training
MEI	Multi-Engine Instructor
MER	Multi-Engine Rating
MFD	Multi-Function Display
MFTD	Maintenance and Flight Crew Training Device
MPA	Multi-Pilot Airplane
NASA	National Aeronautics and Space Administration
NBD	National Bank of Dubai
NTSB	National Transportation Safety Board
PF	Pilot Flying
PM	Pilot Monitoring
PNF	Pilot Not Flying
POI	Principle Operations Inspector
PPC	Pilot Proficiency Check
PPL	Private Pilot License
PTS	Practical Test Standards
QA	Quality Assurance

RAF	British Royal Air Force
RFP	Red Flag Page
RM	Risk Management
R/T	Radio Telephony
SA	Situational Awareness
SBT	Scenario Based Training
SCT	Single Crew Training
SEP	Safety and Emergency Procedures
SFAR	Special Federal Aviation Regulation
SO	Second Officer
SPSS	Statistical Package for the Social Sciences
SRM	Single Pilot Resource Management
TAA	Technically Advanced Aircraft
T/O	Takeoff
UAE	United Arab Emirates
VDRP	Voluntary Disclosure Reporting Program
ZFTT	Zero Flight Time Training

Chapter I

INTRODUCTION

This thesis was approached through an understanding of the history of aviation in the UAE, as well as in the U S Circumstances that led the UAE's airlines to depend on foreign pilots were reviewed The study has proposed a flight training program that would increase the number of UAE national pilots in the work force The ab initio program of one UAE airline and a sample of their pilots' training records were analyzed Various safety programs and the Federal Aviation Administration (FAA) standards have been major components in the development of the proposed ab initio training program

Background

A federation of seven emirates, referred to as the UAE, was amalgamated in the southeastern tip of the Arabian Peninsula along the borders of Saudi Arabia and Oman In 1971, the United Kingdom ended its treaty relationship with the seven emirates and several neighboring countries that had existed since the 17th century The ending of the treaty led to major changes and developments in the region On December 2, 1971, six of the seven emirates (Abu-Dhabi, Dubai, Sharjah, Ajman, Umm Al-Qaiwain, and Fujairah) united to form the UAE Ras Al-Khaimah was the last emirate to join the UAE, and marked 1972 as the year the UAE became fully united (UAE, n d) Figure 1 has depicted a geographical representation of the seven emirates in relation to the Persian Gulf and other countries within the region

Figure 1. The United Arab Emirates (UAE; Adapted from CIA, n.d.).

Since the discovery of oil in the UAE, the country has been experiencing a profound transformation, including structures erected between stretches of sand dunes and the steady cultivation of deserts into gardens and parks. Over the past 35 years, the UAE government has been able to improve its "available jobs," which has achieved the number one status in the region. Thousands of jobs were generated to support both UAE nationals as well as the large number of immigrants. One of the important advancement programs has been the education system. The late President H.H. Sheikh Zayed bin Sultan Al-Nahyan was an advocate of education and believed it to be the basis for a successful and developing country such as the UAE (UAE, n.d.).

According to the Central Intelligence Agency (CIA) World Factbook (n.d.), the level of the UAE's per capita Gross Domestic Product has situated the country's economy in parity with leading western European nations. The country's oil and natural gas revenues, as well as its stance among many foreign countries, have allowed the UAE to develop socially, economically, and technologically. Hence, the country has achieved an important role in Middle Eastern and international affairs (UAE, n.d.).

Due to the UAE's strategic location, many countries had for centuries viewed it as the crossroads between the East and West, and a major link between Europe, the Indian subcontinent, the Far East, and Africa. With the increase in business and number of travelers into and out of the UAE, aviation has become a major focus in the country. Three major airlines have been established in the UAE: Air Arabia, Emirates Airlines, and Etihad Airways (UAE, n.d.).

Aviation in the UAE has dated to the late 1920s when the UAE was still under the influence of the British Royal Air Force (RAF). Flying boats were then used by the RAF for several operations. They used the coastal waters offshore from the capital Abu-Dhabi as their base and Bani Yas Island as a landing strip and fueling facility. In the 1950s, utilization of airplanes in the region was advanced because of oil exploration and air services for offshore operations. By the 1960s, flying had become an everyday operation and necessitated the establishment of an airport in the Al-Bateen area. As Abu-Dhabi's first international airport was completed, Abu-Dhabi had achieved a level of development that increased the city's population and geographic size on a par with the Al-Bateen area. To sustain the increase in population and operations within the city, it was necessary to build a second airport, which has become known as Abu-Dhabi International Airport (ADIA, UAE, n.d.).

In an effort to advance air transportation, the Abu-Dhabi Civil Aviation Department (ADCAD) was established. Over the next few years, aviation in the UAE continued to develop, thereby necessitating the establishment of a new authority to take over ADCAD. In 1996, the General Civil Aviation Authority (GCAA) was established. The GCAA was established to regulate the air transportation system in the country and to increase the competitive strength of the nation s aviation industry Today, the GCAA has received worldwide awards, as well as a set of new projects and goals Among these projects has been the modernization of the air traffic control system and expansion of ADIA (*Welcome to the GCAA*, n d)

As stated by Saifer Rahman, "the UAE has become the region's aviation hub in which our national carriers are playing a significant part" (Rahman, 2006, ¶ 6) In 2005, the number of flights in the UAE increased by a record setting 10 31% to 390,933 The number of daily flights was 1,071, which was considered significant for a nation with a population of less than 5 million The number of aviation providers increased to 497, 15 were national operators This growth in the aviation industry has been expected to increase for another 10-15 years (Rahman)

Despite terrorism concerns, the UAE has improved its air transportation system and expanded worldwide Even though improvements were developed in many sectors in the aviation industry, the UAE still lacked the basis of a well developed training program for its citizens A number of flight schools in the country have been attracting some nationals Two flight schools were developed in the emirates of Dubai and Fujairah that have been offering training to a commercial pilot level However, the number of nationals training at these centers has remained low, the students have mostly been those not pursuing airline careers (*Fujairah Aviation Center*, n d)

Emiratization

The UAE, with a population of 2 56 million, has always provided a comfortable life style for both the UAE nationals and expatriates With the help of the oil sector, the country's economy has been continuously improving There has been a resulting increase in the number of job sectors, both public and private. Due to the low number of UAE nationals with the proper qualifications and skills, these sectors have necessitated the employment of a large number of expatriates. Due to security concerns and governmental policies, some public sectors have been limited to UAE nationals even though some of them were not properly qualified for the jobs (Albuainain, n.d.)

The government of the UAE has viewed the imbalance between nationals and expatriates in the workforce with concern. Emiratization has been defined as the process of educating, training, and qualifying UAE nationals through approved curricula to increase the number of competent UAE nationals in the workforce (National Bank of Dubai [NBD], 2005). Despite the combined efforts of all seven emirates, the UAE has continued to have one of the lowest unemployment placement levels in the world with nationals filling only 9% of the total workforce (Kawach, 2002). As displayed in Figure 2, the UAE and Oman have both had a 15% unemployment rate, the highest rates among the Gulf Cooperation Council countries (NBD, 2005).

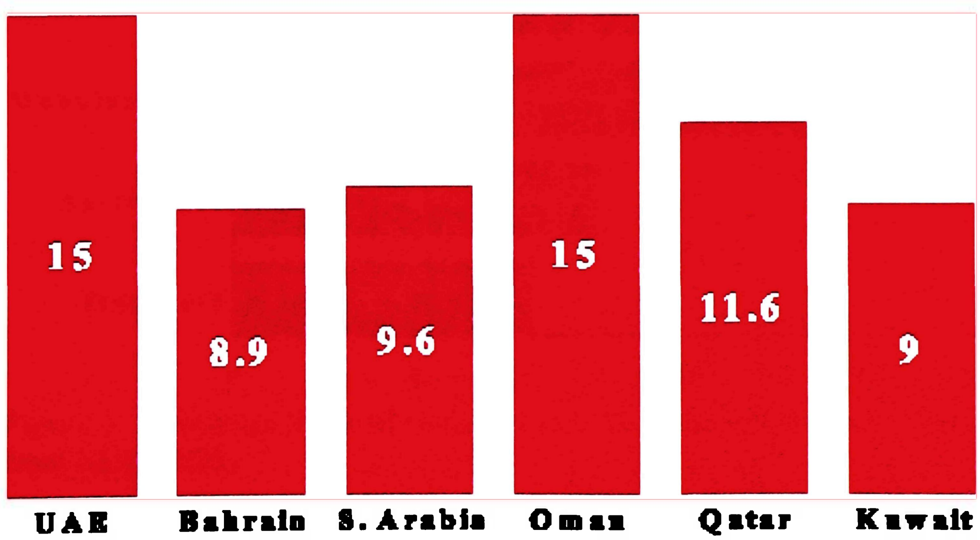

Figure 2. Unemployment Rate in GCC Countries (2003; Adapted from NBD, 2005).

According to the UAE Labour Minister, Dr. Ali Al-Kaabi, 33,000 UAE nationals were unemployed, despite the 600,000 jobs generated annually, because of a lack of qualifications and skills. Al-Kaabi stated that "UAE nationals are quite capable of proving themselves in any position once they are given the right opportunities and proper training" (*Emiratisation is top priority*, n.d., ¶ 2). One source of difficulty may have been the nation's educational system. To address this, educational institutions reviewed their curricula and formulated changes to meet workforce demands (Ibrahim, 2004).

According to statistics provided by the NBD (2005), the transportation sector represented the lowest percentage of UAE nationals as depicted in Figure 3. This implied a deficiency in training programs provided to nationals in the transportation sector. With aviation falling in the transportation sector, and with three main airlines in the UAE, 6.5% was considered a number that needed to be increased (NBD).

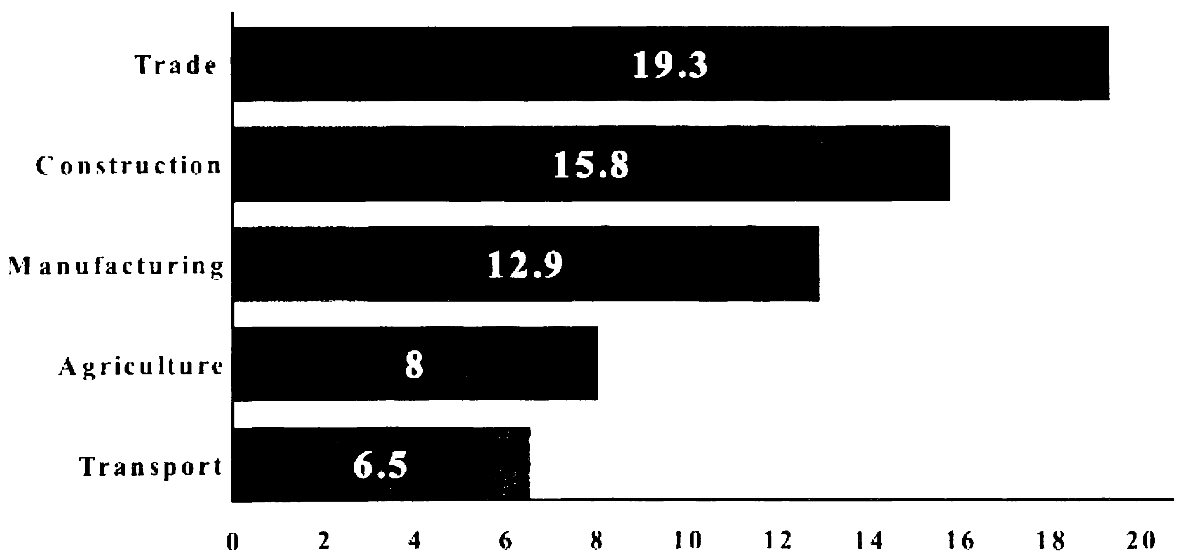

Figure 3. Percentage Share of Nationals in UAE Total Employment (2002; Adapted from NDB, 2005).

Due to the lack of General Aviation (GA) training conducted in the UAE and the low number of national pilots in the work force, aviation in the U S was expected to play an integral part in the process of understanding what the UAE needed in terms of flight training and program development In order to obtain a better picture of the aviation sector in the U S , it was important to understand how it evolved, and to examine some of the setbacks that negatively impacted flight safety

Aviation Safety

Safety has been considered a broad concept used in a wide range of industries Each industry has had separate goals and economic sectors, but safety has always been essential to all There have been many definitions of safety It has been viewed by the Department of Health Science at Illinois State University as a process by which industry professionals minimize risk Safety processes have involved the interpretation of federal regulations upon which highly standardized programs and training curriculums were developed (Illinois State University, n d)

Aviation safety in the United States has dated to 1918 when the federal Air Mail Service (AMS) provided 24-hour service between New York and San Francisco As a safety procedure, the government mandated strict pilot selection and medical examination procedures Aircraft were also evaluated through an extensive inspection regime (Wells & Rodrigues, 2003)

The AMS safety programs determined the fatality rate was 1 per 789,000 miles flown between 1922 and 1925 Herbert Hoover, then the president of the U S said, "It is interesting to note that this is the only industry that favors having itself regulated by government" (Hansen, McAndrews, & Berkelely, 2005, p 2)

During the 1920s, the Kelly Air Mail Act initiated the private air mail contracts. The Aeronautics Branch (AB) was established via the Air Commerce Act. Some of the main responsibilities of the AB were the certification of airmen, licensing of aircraft, and expansion of air traffic regulations. This shift of responsibilities resulted in a reduction in the fatality rate of 50%, and lowered insurance rates (Hansen et al., 2005).

Fatal accidents between 1920 and 1975 were categorized by different operators as seen in Figure 4. The graph compared three different rates: air carrier fatal accidents per plane mile, air carrier fatalities per passenger mile, and GA fatal accidents per mile flown.

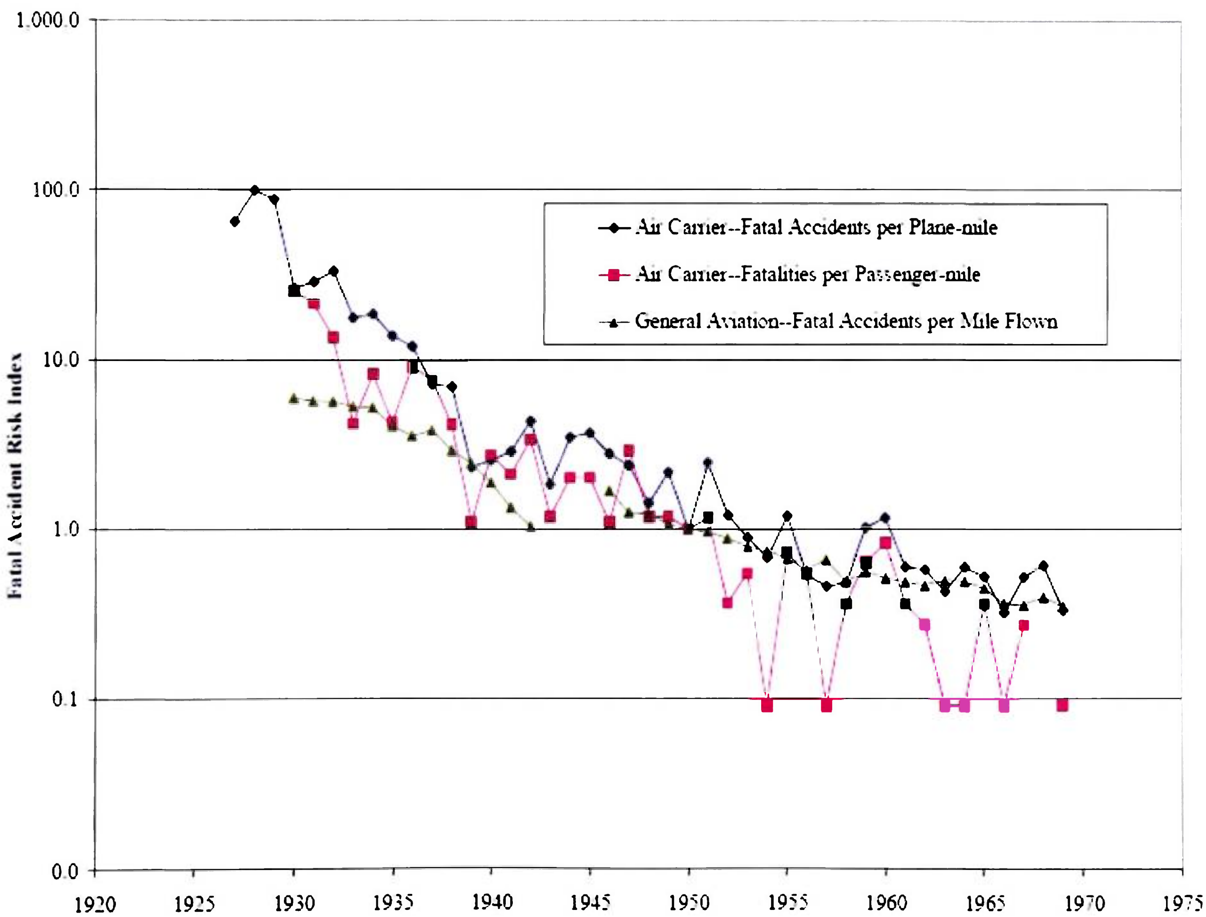

Figure 4. U.S. Fatal Accident Rates between 1920 and 1975 (Adapted from NTSB, n.d.).

All three rates showed an improvement and reduction in fatal accidents over the years The GA rate was the slowest to improve, likely because it did not benefit from the war effort as much as other sectors (The war effort was believed to be the cause for the discontinuation of GA during the early 1940s) The reduction in fatal accidents has been generally viewed as a result of advancements in aircraft design, better air navigation systems, and general improvements in air carriers operations

In the early 1930s, the first regulations to restrict airman flight times limited pilots to 8 hours per 24-hr day, 100 hours per month, 1,000 hours every 12 months, and 30 hours every 7 days These limits have been in use to this day, with the exception of 120 hours per month (although constrained to the 1,000 hours per 12 months) for augmented crews Further developments have included the establishment of training standards, maneuvering procedures, weather restrictions, and flight operations (Wells & Rodrigues, 2003)

Advancements in technology and aircraft design have supported the expansion of the industry The expansion necessitated additional regulations, limitations, certifications, and improvements in airways and airport design In 1938, the Civil Aeronautics Act aided economic regulations and assisted route certifications A byproduct of the Civil Aeronautics Act was the Civil Aeronautics Authority (CAA), which was responsible for the development and regulation of safety programs These programs regulated air mail rates, certifications of airline routes, and airline tariffs (Wells & Rodrigues, 2003)

World War II was the catalyst for the aviation industry's evolution Aircraft design technology improved and introduced pressurized aircraft capable of traveling at higher altitudes and faster speeds The DC-7, manufactured by the Douglas Aircraft

Company, and the Constellation, manufactured by the Lockheed Aircraft Corporation, were two major aircraft involved in the expansion of air travel and air freight operations. The collision of a DC-7 and a Constellation over the Grand Canyon in 1956 created a demand for Congress to form a body to regulate air traffic. As a result, the Federal Aviation Agency was established under the Federal Aviation Act. Its main responsibility was to regulate safety, help improve Air Traffic Control (ATC) and navigation systems, as well as control airspace segmentation and regulations (Wells & Rodrigues, 2003).

In 1966, the agency became a part of the Department of Transportation (DOT) and became the Federal Aviation Administration (FAA). Since the 1960s, the FAA has regulated and developed safety, air navigation, ATC, airman training, and air carrier operations (FAA, n.d.c).

The FAA has initiated programs to improve airline operations, such as the Advanced Qualification Program (AQP), the Aviation Safety Action Program (ASAP), Flight Operational Quality Assurance (FOQA), and the Voluntary Disclosure Reporting Program (VDRP). Even though these were developed as voluntary programs, airlines viewed them as necessities for the enhancement of their operational safety level (FAA, n.d.f).

The programs were developed to improve commercial air transportation under the Code of Federal Regulations (CFR) Parts 121 and 135. The GA sector had not benefited from as many such programs until recently when the FAA and a group of industry and academic institutions initiated a new training program to improve pilots' flying skills through scenario based training (FAA, n.d.d).

The fatal accidents in fixed gear, retractable gear, and multi-engine aircraft have been attributed numerous causes as indicated by Figures 5, 6, and 7 (adapted from the Experimental Aircraft Association [EAA], n.d.). It has been shown that the highest levels of fatal accidents have been caused by stalls during times of reduced visibility (e.g., instrument meteorological conditions and at night). Underlying factors for the high fatal accident rates were a lack of instrument training and certification requirements. It has been believed that the rate could be reduced by the development of new training programs for GA pilots.

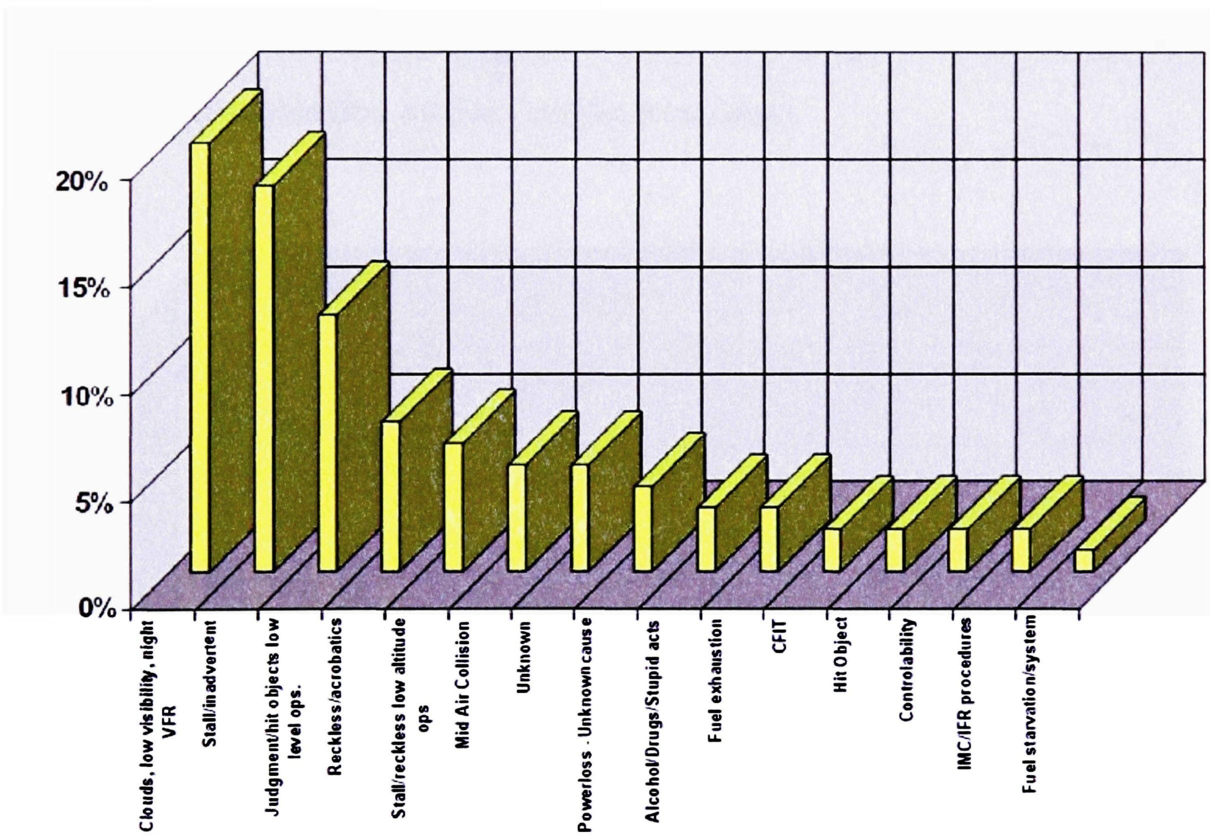

Figure 5. Fixed Gear Aircraft Fatal Accident Causes.

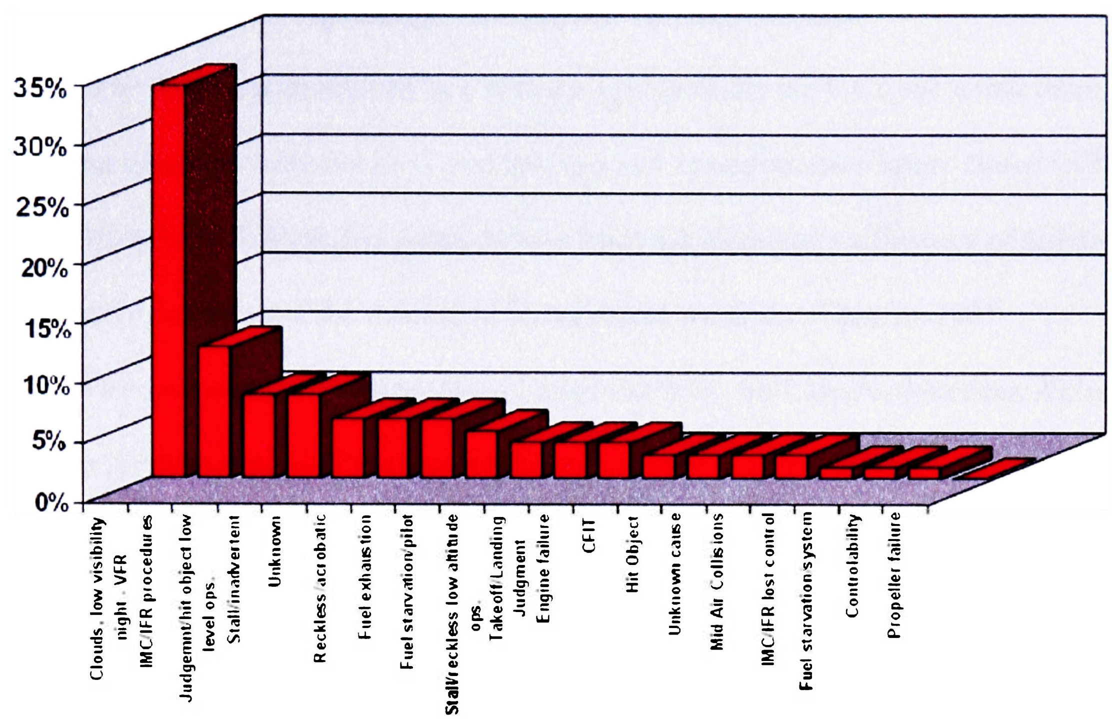

Figure 6. Retractable Gear Aircraft Fatal Accident Causes.

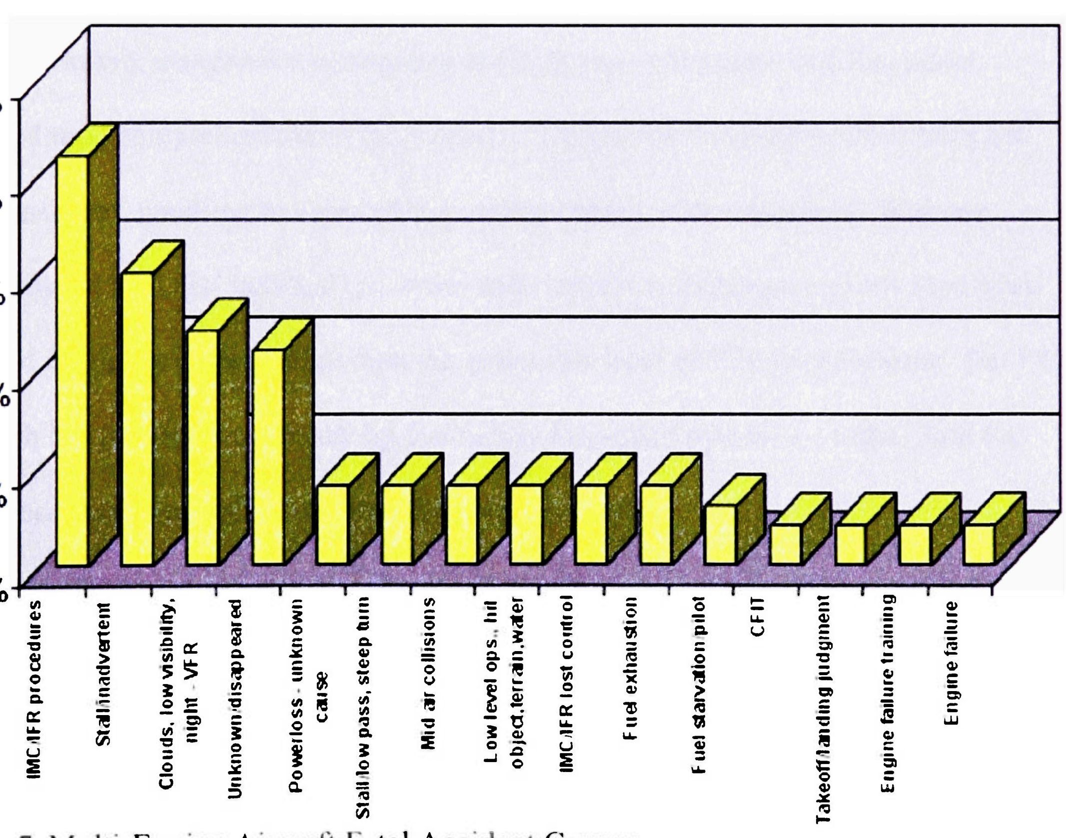

Figure 7. Multi-Engine Aircraft Fatal Accident Causes.

Advantages of Alternate Training Methods

The AQP was developed as a voluntary program by the FAA and a task force, including members from the DOT and the National Transportation Safety Board (NTSB). The primary goals behind this program have been the increased proficiency of airline pilots and a reduction in the number of human error accidents. Since its 1987 introduction, a number of airlines (e.g., United Airlines, Air Canada, American Airlines, Alaskan Airlines, and Gulf Air) have initiated an AQP (Farrow, 2005).

The AQP has guaranteed pilots' proficiency levels at the end of each stage check. Flight crews have not passed a stage unless they were proficient and met the standards, even though hour requirements were met. On the other hand, GA training has been more hour-oriented; pilots have received ratings as soon as the hours specified by the Federal Aviation Regulations (FARs) and the Practical Test Standards (PTS) have been met.

However, standards mentioned in the PTS have not guaranteed that pilots exhibited total comprehension of the subjects. Designated Examiners (DEs) have not been consistent, resulting in variability in interpretation of the standards. With the knowledge of the DEs' habitual questions and evaluation techniques, pilots have been prepared for the examiner rather than the entire spectrum of PTS requirements. The PTS approach has judged competency by evaluating disjointed maneuvers rather than the overall conduct of a flight developed from start to finish.

As illustrated in Figure 8, "Personal and Business" operations had the highest rate of GA accidents from 1991 to 2000. "Flight Instruction" was the second highest with few changes during the 10 years, with an average accident rate of 300 per year. It has been questioned if the lack of improvements in the accident rate was the result of the aforementioned training procedures (NTSB, n.d.).

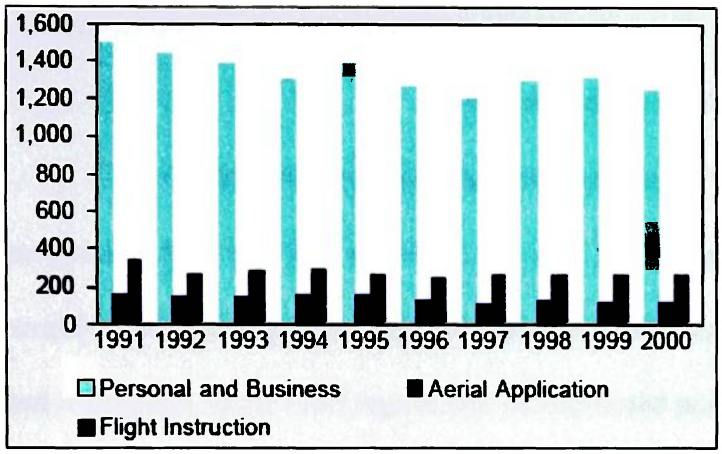

Figure 8. Number of Accidents by Type of Operation (Adapted from NTSB, n.d.).

A new training approach called the FAA/Industry Training Standards (FITS) has been developed by the FAA and a group of academic institutions. The main goal of FITS has been the reduction of the number of GA accidents through the development of a highly standardized and efficient training program. The program has been designed to improve pilot skills and decision making processes. These programs have ensured pilots' proficiency levels by situating them in a scenario-based training program (FAA, n.d.d).

The development of a new training program incorporating heuristics from both the AQP and FITS has been planned to deliver beneficial results in the UAE. Its design has focused on providing a unique transition for pilots to the airline cockpit at a high proficiency level via the utilization of advanced automation systems.

Statement of the Problem

The low number of qualified UAE nationals for employment in the aviation sector has created a reliance on foreign nationals to operate the nation's airlines. The government of the UAE has considered the reliance on foreign pilots as a future threat to the development of its national transportation system The lack of accredited flight training programs in the UAE has been a major cause behind the low rate of UAE citizens as qualified crewmembers

Purpose of the Study

This study has introduced the development of an airline ab initio flight training program in the UAE that would increase the percentage of UAE pilots in the airlines' workforces The analytical approach toward Emiratization utilized data from another ab initio program in the Gulf region and incorporated principles of the FAA standards and safety programs

Delimitations

This thesis focused primarily on the civil aviation sector The Line Training Records (LTRs) that were obtained from one of the airlines in the UAE presented a sample of the pilots enrolled in their ab initio program The de-identified airline's program was evaluated and used only as a source of assessment that helped with the development of the preliminary stages of a new training approach in the UAE Even though military training was bypassed in this study, the UAE Air Force could become a vital segment of the proposed program in the near future

The airline that provided the LTRs, and the Second Officers (SOs) who were evaluated during their ab initio program, were treated as proprietary and both were de-identified The only shared information included the SOs' flight time and performance in the Airbus A-320 simulator, as well as the airline's ab initio training curricula, which are presented in the Appendixes Additionally, the airline's ab initio program cost benefit analysis was not researched; the study focused on the preliminary stages of developing a new flight training program.

Definition of Terms

Ab initio: A Latin word translating to "from the beginning." Airlines have been using the term, ab initio, to refer to their flight training program that sponsors airline candidates with zero flight hours. Selected candidates are trained from the beginning until they are qualified to operate as First Officers (FOs; Author).

Advanced Qualification Program (AQP): "An alternate qualification program for personnel operating under FAR parts 121 and 135 and for evaluators and instructors of recognized training centers that will provide such training. An AQP integrates a number of training features and factors aimed at improving airman performance when compared to traditional programs" (Farrow, 1997, ¶ 1).

Airport Familiarization Program (AFP): A program that utilizes selected software designed to convert flight-recorded data into 3-D animations. The program is utilized to enhance pilots' confidence levels and familiarization with particular approaches (Treadway, 2006).

Aviation Safety Action Program (ASAP): "ASAP is a voluntary program under which employees of 14 CFR Part 121 or 135 certificate holders may report safety related events, including possible violations by the reporting employees themselves, of violations of U.S. Federal Aviation Administration (FAA) regulations" (Weitzel, 2006).

Crew Resource Management (CRM): "The effective utilization of all available resources, hardware, software, and liveware – to achieve safe, efficient flight operations" (Gregorich, Helmreich, & Wilhelm, 1990, p. 682).

Emiratization: "It is a movement by the government of the United Arab Emirates (UAE) to proactively employ its citizens in the public and private sectors to reduce its dependence on foreign workers" (Wikipedia Encyclopedia, 2006).

Flight Operational Quality Assurance (FOQA) Program: "FOQA is a voluntary program that entails the routine acquisition and analysis of digital flight data from air carrier operations, and corrective action for adverse trends revealed by that data" (Weitzel, 2006).

Flight Training Device (FTD): A device that replicates a particular aircraft's cockpit for training purposes. However, it does not generate flight motion as provided by the FFS (Author).

Full Flight Simulator (FFS): A system that simulates flight motion and environment through the utilization of a highly advanced visual system and hydraulic/ electrical systems (Author).

Glass Cockpit: "Is an aircraft cockpit that features electronic instrument displays. It utilizes computer-controlled displays that can be adjusted to display flight information as needed. This simplifies the cockpit enormously and allows pilots to focus only on the most pertinent information" (Wikipedia Encyclopedia, 2006).

Line Operations Safety Audit (LOSA): A strategy aimed at identifying threats to aviation safety through observations of normal flight operations (Author).

Technically Advanced Aircraft (TAA): Aircraft built with highly advanced equipments and features similar to the technology found in large commercial aircraft (i.e., glass cockpit, auto-pilot, and Global Positioning System (GPS; Author).

Chapter II

REVIEW OF RELEVANT LITERATURE

Four underpinning, interwoven topics have comprised the solution to the aviation training needs of Emiratization. These three programs, and one component, have been the ab initio program, the AQP, Crew Resource Management (CRM), and the FITS.

Ab Initio Training and Flight Simulation

There have been two main tracks that allowed a student pilot to become an airline flight crewmember. The first type, commonly followed in the U.S., has been the modular training approach through which student pilots have gradually migrated to airline flight operations. Through this approach, a student pilot has gained experience and knowledge of flight by initially obtaining the Private Pilot Certificate (License in other regions of the world; hence, PPL). The PPL has been followed by the Instrument Rating (IR) and the Commercial Pilot Certificate/License (CPL). Pilots have added the Multi-Engine Rating (MER) as they have continued to build hours to meet the experience requirements of the airlines ("Ab-Initio & Modular Training," 2004).

To lower flight expenses, many pilots have continued to pursue their Certified Flight Instructor (CFI), enabling them to build hours while instructing other pilots. Also, the CFI-Instrument (CFII) and the Multi-Engine Instructor (MEI) privileges have allowed pilots to instruct Instrument and Multi-Engine pilots respectively. Upon reaching the required number of hours, pilots have applied to the airlines where they received additional training in flight simulators that improved their competency and bridged the gap to a selected jet transport aircraft type, "this is the most common way to train" ("Ab-Initio & Modular Training," 2004, ¶ 3)

In the European training model, the ab initio program has been approached more commonly than the modular training program Ab initio has originated from Latin, translating to "from the beginning " Pilots in the ab initio program have been trained to airline standards from "zero flight hours" to type-rating in a particular aircraft Certificates and ratings have not been attained throughout the ab initio programs as they have been in the modular model, a graduation certificate has been attained at the completion of the training This graduation certificate has allowed pilots to exercise the necessary privileges as an airline flight crewmember ("Ab-Initio & Modular Training," 2004)

Unlike flight training conducted in the U S , pilots in a European ab initio program have been following an approach sponsored by the respective airlines who covered all the costs and flight expenses The ab initio training program has been utilizing flight simulators extensively in training The proliferation of Technologically Advanced Aircraft (TAA) has necessitated training in automated flight control systems In addition to automation training, the necessary knowledge and skills for a modern flight crewmember have included cross-cockpit coordination and CRM All of these must have been successfully integrated during the transition of ab initio trainees to airline First Officers (FOs, Phillips, 2004)

The past few decades have witnessed changes in the flight training sector, as well as rapid advancements in the simulators and levels of automation utilized for training Consequently, new training concepts in the use of flight deck automation were developed and existing training programs were enhanced to add value and quality to the training Contemporary ab initio programs have involved various training techniques that have acquainted pilots with the advancements of automated flight decks (Phillips, 2004)

Flight training techniques in the U S have been considerably different from the European and Australian techniques As previously mentioned, pilots in the U S have been acquiring their certificates and ratings through flight schools in the form of modular techniques under CFR Parts 61, 141, or 142 None of these regulatory Parts have specifically required training in the use of automation or the concept of multi-crew training Rigner and Dekker (2000) concluded that making small airplanes look like the big ones will not solve the deficiencies in training techniques currently utilized It has been viewed as a significant challenge to transition pilots from a single-crew to multi-crew operations (Rigner & Dekker)

According to Rigner and Dekker (2000), pilots have been expected to obtain higher management and integration skills via glass cockpit training devices and the integration of the advancements found in modern jet transport aircraft Early exposure to the Global Positioning System (GPS) and automated flight controls has facilitated an easier transition into the jet transport aircraft Furthermore, Rigner and Dekker's idea of sharing experiences and new training strategies among airlines and other flight academies has been considered good technique This technique has improved future pilot training curricula, in turn, providing a more efficient industry with well trained pilots (Rigner & Dekker)

There has not been an ab initio program in the U S that would transition a pilot with flight time as low as 350 hours directly to an airliner (Phillips, 2004) The reason behind this was noted by a spokesperson for a major airline "With more than 10,000 pilot applications from qualified individuals in our database, why would we want to consider the European method of sponsoring pilots or considering applicants with less flight time than our standard minimums?" (Phillips, ¶18)

The key in ab initio training programs has been the combination of several training concepts and programs with flight simulators An airline with a number of flight simulators simply did not solve the problem of efficient training Indeed, flight simulators have drastically improved with the years Simulators have become highly advanced with higher fidelity visual systems simulating terrain, airports, weather, etc at a much higher graphical quality Applications of learning in simulators have ranged from stick-and-rudder skills to combat maneuvering skills, the motivation for utilizing simulators has been increasing during the 21st century

The processes of developing simulator training devices have been involving engineers, psychologists, aviators, and many more Each of the aforementioned has concentrated on specific aspects that have advanced the developmental process of building an efficient simulator Manufacturing an advanced simulator has not been the problem, the challenge has been in the ability to fuse the multiple disciplines involved in developing the device (Salas, Bowers & Rhodenizer, 1998)

It has been viewed as essential to involve the learning process such as pilots cognitive abilities and behavioral attitudes when developing the simulators and the training programs Several training programs have taken these factors into account and approached simulator training with a different philosophy The AQP and CRM have been exemplars (Salas et al 1998)

The AQP

"Human factors" has been defined as the rapidly developing technology primarily used to enhance the relationship between humans and systematic applications (Wiener & Nagel, 1988). Human factors have played a significant role in aviation; problems associated with human factors have existed at least since World War II. Over the past few decades, there have been noticeable improvements in various aviation sectors, primarily aircraft design and manufacturing, which have added to aircraft safety. However, human error has persisted as a result of (a) poor pilot training or (b) a weak relationship between the pilots and technologically advanced cockpits (Helmreich & Merritt, n.d.).

According to Wiener and Nagel (1988), a significant number of incidents and accidents were occurring due to human error. Figure 9 has depicted the number of accidents in Part 121 and 135 (scheduled and on-demand) from 1991 to 2000; it is widely accepted that human error has continued as a contributor to air carrier accidents.

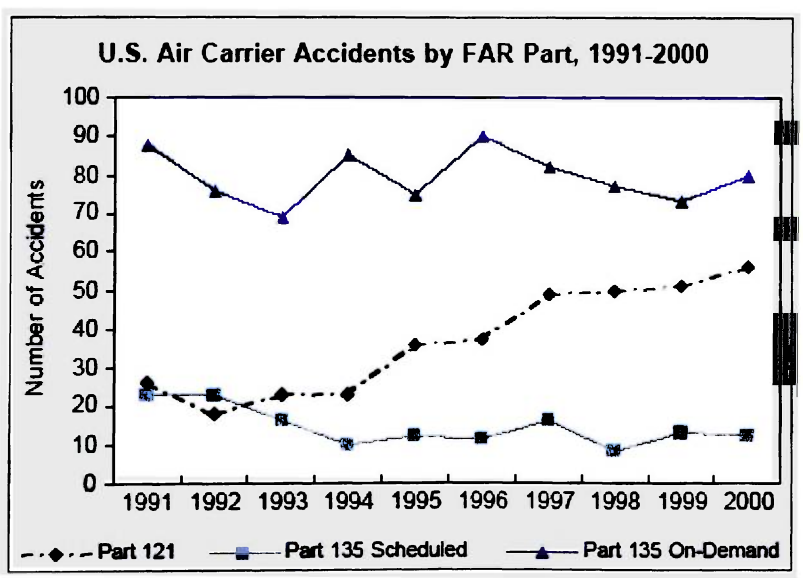

Figure 9. Annual Review of Aircraft Accident Data (Adapted from NTSB, n.d.).

As the increase in aircraft accidents and fatalities attracted public attention, the regulators were motivated to take action. In 1987, a government-industry task force was formed to work toward resolving this issue This task force included the air carriers, the Department of Transportation (DOT), the National Aeronautics and Space Administration (NASA), the pilot unions, the FAA, and the NTSB (Seltzer, 2005).

The task force focused on three major areas. The first area was the man/machine interface because advancements in aircraft technology were exceeding the pilots' adaptability. There were significant improvements in aircraft design and manufacturing, but pilots were still influenced by older aircraft technology. The second area was flight crewmember training; it was obvious to the task force that pilot training needed improvements in order for the crew to cope with advancements in aircraft technology. The third area was the operating environment and how it could be improved (Seltzer, 2005).

The task force, with unanimous agreement, developed several recommendations to improve the identified areas. After 3 years, the development of the AQP was first introduced. And on October 2, 1990, the AQP was formally announced when the FAA released a Special Federal Aviation Regulation (SFAR) 58 that outlined the guidelines for the new program that assisted operators with the initial implementation stages (Farrow, 1997).

An AQP has been offered by the FAA to all airlines and training centers across the U.S., and several other countries, to improve their training programs Its core objective has been aimed at developing proficiency in crew training, rather than mere compliance In the past, the regulatory framework outlined the hours of ground and flight sessions in crew training. Under this system, the passage of the written exam was all that was necessary to become qualified. With the AQP, there has not been a defined number of required hours of training. Proficiency has had to be demonstrated by the crew, either as individuals or as a team. Once proficiency has been demonstrated, training has been considered complete. Hence, training, evaluation, certification, and qualification were all based on proficiency (*Development and implementation of an AQP*, 2005).

Contemporary aircraft have utilized advanced, integrated computerization. With these changes in aircraft technology, training has advanced as well. One of the major emphases in AQP has been the use of simulators and other sophisticated electronics and computer software. AQP has emphasized full crew interaction, state-of-the-art computer training, Line Oriented Flight Training (LOFT), Line Operational Simulation, and Line Operational Evaluation. It has focused on the team concept, such as CRM, rather than training pilots as individuals. This method has ensured crew proficiency and not simply compliancy (FAA, n.d.a).

Even though an AQP has been a voluntary program, once an airline has decided to implement one, certain concepts have become mandatory (Seltzer, 2005). According to SFAR 58, training data have been gathered by the airlines so as to allow the FAA to monitor the progress of each airline. This allowed the FAA to check if an airline had been following the objectives in developing an AQP. The FAA validated, implemented, and maintained each airline's AQP as long as every phase of the process was accomplished properly. These concepts were also stated in SFAR 58 and they were as follows:

1. If an airline wishes to initiate an AQP, the entire fleet must be under an AQP.
2. CRM training must be implemented.

3. Line Operational Simulation must be utilized
4. Improved Instructor/Evaluator training and guidelines must be developed (*Development and implementation of an AQP*, 2005)

Depending on the airline's implementation of the program, each airline has usually interacted with two main parties the FAA Headquarters and the Extended Review Team (ERT) Both parties have been involved in the program from its initial stages to its final steps These parties may have included the Safety Inspectors, Aircrew Program Managers, System Design Specialist, and Training Center Program Manager Depending on the size and type of the fleet, the involvement of each party varied according to the airlines need (*Development and implementation of an AQP*, 2005)

The Five Phases

Before an AQP has been implemented, an airline has had to pass through a 5-phase process, where quality assurance played an integral part The whole purpose behind these five phases has been to ensure that the airlines were familiar with AQP limitations and mandated responsibilities Moreover, the five phases have ensured that the airlines were developing their programs appropriately with the supervision of the FAA, when necessary, the FAA has interceded and provided further modifications and adjustments The phases were explained by Seltzer (2005) as follows

1. Initial Application The airline submitted its initial application stating the training objectives and action plans This was done by sending a letter to the Principle Operations Inspector (POI) The FAA then arranged a conference with the representatives of the airline's training department This conference ensured that each airline understood and gained knowledge on all the

responsibilities and commitments needed to run an AQP (*Development and implementation of an AQP*, 2005).

An AQP application/administration document was developed to establish the airline's methodology and procedures for developing an AQP for its fleet and Instructor/Evaluators (I/Es). This document was later submitted when the airline applied for a program approval. After the program approval was received, the application/administration document was submitted to allow the airline to proceed further. (*Development and implementation of an AQP*, 2005):

2. Curriculum Development: This involved the proficiency objective, the syllabus, the training resource requirements, and the implementation and operation plans. The developmental process involved five stages, each of which was developed for the pilots and the I/E:
    a. Job Task Analysis (JTA): The simplification of work units into basic components.
    b. Qualification Standards: Developed by the help of the JTA.
    c. Instructional systems Development (ISD) Methodology: The fourth document to an AQP that must have been maintained throughout the entire program. An ISD must have been finalized before developing a curriculum for a certain position.
    d. Curriculum Outlines: The document that described the training and evaluation process and provided a planned schedule for each day in the curriculum.

e. Implementation and Operations (I&O): The documents behind the I&O eased the transition to an AQP for crew member and I/E.

3. Training System Implementation: At this stage the curriculum was taken into action and the courses were developed. The I/Es were trained and certified as the program audit data base was finally put into use in formatting evaluation of courseware. Tryouts were then implemented as a testing process that ensured validity and reliability of the airline's progress. Usually, during this stage, pilot proficiency was not a jeopardy event. The engineers and computer programmers worked together to finalize the process and address unexpected situations.
4. Initial Operations: At this point the crews were transitioned into an AQP curriculum and trained, qualified, and certified. As has been required by the FAA, data from training were collected and saved for analysis. After 24 months, the airlines were then transferred to phase five, where the FAA spent a considerable amount of time evaluating the airlines' program and ensuring compliance.
5. Continuing Operations: This phase has been viewed as the maintenance stage for the AQP, where analysis of data has been implemented to check if any refinements to the program were necessary.

Advantages and Disadvantages

One of the advantages in an AQP has been the accounting of the previous level of experience for each pilot in the training program. Because of this, instructors avoided having students in classes or in training programs with diverse knowledge and experience levels. Figure 10 has illustrated an example of two pilots with different backgrounds who initiated their training on a common aircraft. One pilot previously flew a DC-8 and one an F-14. It would not have been practical to have both attend the same training. It has been viewed as more beneficial to have them trained separately until they reach a common level of qualifications and standards. By doing so, both pilots had equal experience levels when trained as one crew and ensured that all pilots were on the same level of knowledge and proficiency standards (*Development and implementation of an AQP*, 2005).

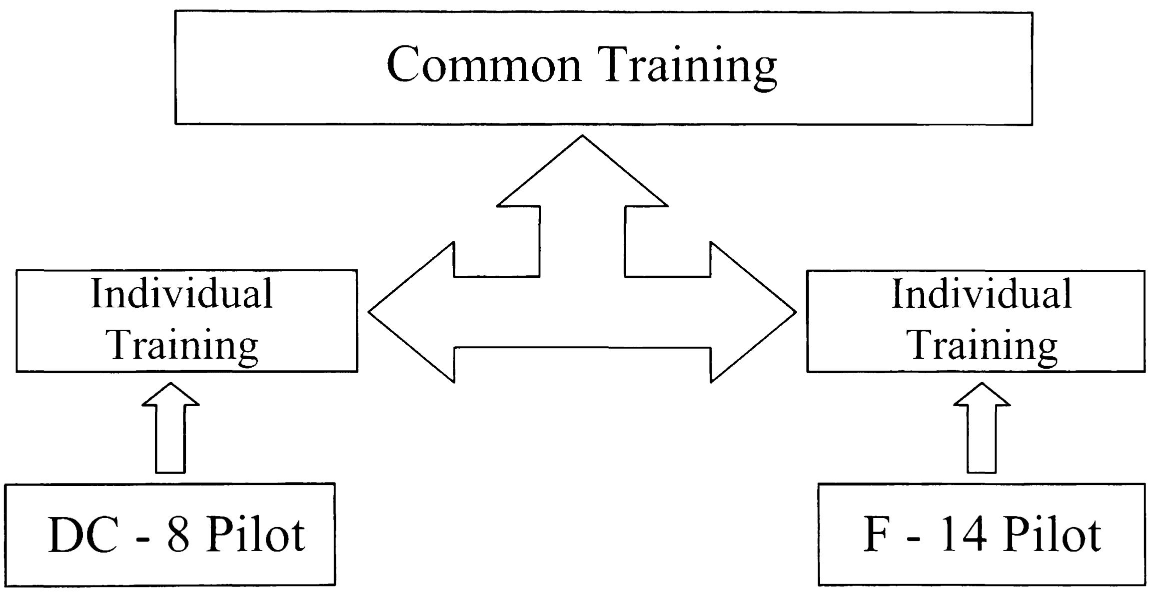

Figure 10. The AQP's Training Methodology.

Since 1987, task force members have been working together to decrease the accident rate, which had reached a critical point in the 1970s. From 1987 forward, members of the task force worked together and shared information on their progress. This has been considered as one of the features that separated an AQP from other training required by the FARs Information shared among airlines has positioned the industry on a progressive track toward higher levels of safety

Moreover, the nature of an AQP has allowed for a nonpunitive environment that has helped foster cooperation and information sharing among the airlines The AQP has brought airlines together and strengthened their safety initiatives Airlines have shared a common interdependency in their safety programs and the sharing of information has been mutually beneficial (Farrow, 2006)

The financial resources needed to initiate and operate the AQP have been viewed by airlines as a disincentive for the program (Seltzer, 2005) Cost has been the most common reason why airlines have opted not to participate A significant AQP expense has been stated in the required documentation Another cost factor has been the utilization of advanced simulators for training as required by SFAR 58 Data collection and archiving have added to the AQP's operational costs Computer software and hardware that have been utilized by airlines to manipulate data and submit reports to the FAA resulted in additional expenses I/Es have increased the costs as well, since they have required a separate training program

Implementing the five phases has taken years before an airline could be fully operating under an AQP Initial operations of the program have taken up to 24 months before the airline was capable of proceeding to the next phase Moreover, the entire fleet must eventually be enrolled in an AQP, even if the fleet has consisted of different aircraft models (Farrow, 2006)

Long term benefits motivating the adoption of an AQP have included (a) greater flexibility, (b) more efficient training, (c) elevated training standards, and (d) enhanced crewmember performance The implementation of an AQP program has allowed the airlines to tailor their own training program depending on their needs and requirements (Seltzer, 2005)

The I/Es

The I/Es have been considered as airline employees who have passed a set of training and evaluation sessions that qualified them to evaluate the performance of crew members, instructors, evaluators, and operational personnel The I/Es have been viewed as the backbone of the AQP Without qualified I/Es, the program would have been ineffective One of the requirements of SFAR 58 was that each AQP must have I/E indoctrination, qualification, and continuing qualification curricula, which required separate JTA qualification standards and curricula for I/Es and flight crewmembers (*Development and implementation of an AQP*, 2005)

The I/Es have completed a series of sessions that developed their techniques in dealing with crewmembers Some of the basic actions required by the I/E to qualify have included (a) briefing, (b) debriefing, (c) flying, (d) instructing, and (e) operating the simulators while occupying either crewmember positions A separate AQP curriculum was required to maintain proficiency, and was mandated to be higher than that of crewmembers With the qualified I/Es, the airlines have set operational standards and ensured the level of I/E and crewmember qualifications (*Development and implementation of an AQP*, 2005)

The I/Es have maintained their proficiency by using changing flight scenarios The different scenarios have ensured the element of surprise, preventing the I/Es from responding to a certain scenario via memory of having used that scenario with one of the crewmembers. The continuing qualification segment has included a set of requirements that must have been met, such as:

1. Ground and flight training
2. Critical examination of each I/E's ability to prescribed standards
3. A schedule for recency of I/E's experience and proficiency

Quality Assurance

A Quality Assurance (QA) program has been developed to maintain the quality of an AQP and continuously improve the program's performance by monitoring the performance of I/Es, as well as the performance of the crew members. One of the applicants in an AQP has been chosen to develop the QA and to evaluate the training procedures on a continuous basis. Usually, the person most experienced among the group has been assigned the task. S/he has been expected to carry out the QA program and have ensured that duties were performed at an acceptable level of proficiency. The QA I/Es have been required to observe training, validation, and evaluation events in order to critique performance, recommend changes to the training program as needed, and provide feedback to the overall organization on an ongoing basis (Goldsmith & Johnson, 2002).

Standardization and Calibration

Standardization of the I/Es has been critical. It has been necessary to establish a uniform grading criterion, address reliability between I/Es, and develop remediation procedures. A scenario has been given to new I/Es to evaluate a group of pilots in order to differentiate the evaluation practices of the I/Es. The results have been compared with senior I/Es and Chief Pilots. A calibration process has then begun by understanding why some I/Es chose different ratings for the same event. Figure 11 has presented a sample of data collected from I/Es with a grading scale from 1 to 4. The reason for selecting a 4-point scale was to establish a more sensitive scale than a pass/fail grade. In choosing a scaling methodology, the airline must have considered the number of points believed to be most efficient to its type of operations (Farrow, 2006).

A 5-point scale has involved some disadvantages attributed to the tendency of I/Es to give a median score of 3 in most of their grading data. This has resulted in data with an invalid average of 3. Choosing an even number scale would have avoided invalid evaluations by I/Es and produced more accurate data (Farrow, 2006).

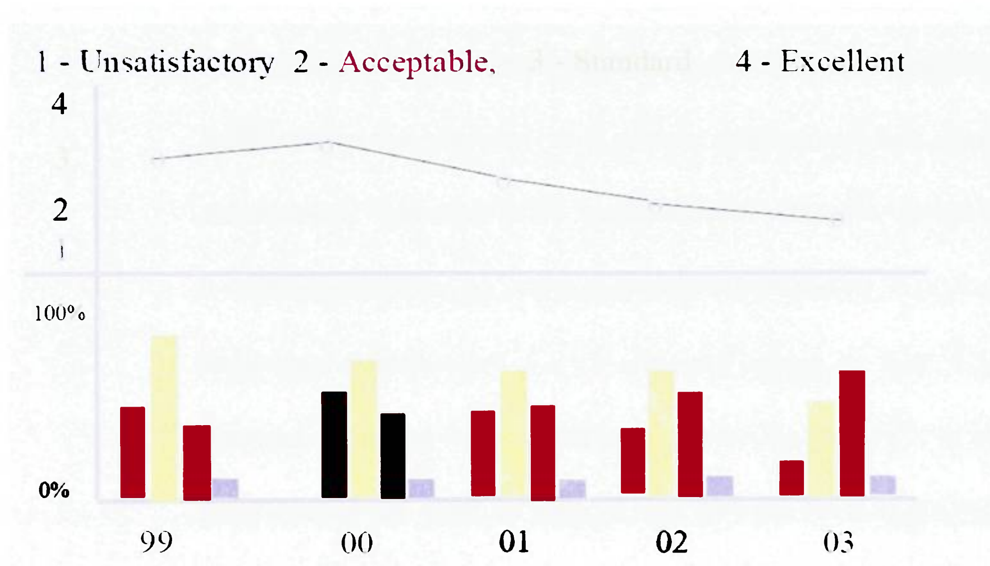

Figure 11. Multi-Point Scale Grading (Adapted from Farrow, 2006).

Calibration of the I/Es has been important even when a 4-point scale was used because I/Es might have two extremes: If an I/E evaluated pilots as either 1 or 4, the pilots would be considered either extremely bad or really good. This would have resulted in a constant average and inaccurate data as well. The I/Es were to be calibrated so that no matter which evaluator recorded the performance, the pilot would receive a consistent evaluation (Farrow, 2006).

AQP Data Management

As required by the FAA, airlines have (a) saved the training data of their crewmembers, instructors, and evaluators to prove that their program has met the overall objectives of the curriculum and (b) evaluated the effectiveness of their own performance (FAA, n.d.b). The data gathered have been categorized into two types:

1. Individual qualification records: These were data that were identifiable and gave details on: who were qualifying and have already qualified under an AQP, when and how they qualified, and the requirements that they had to fulfill. It has also showed work history information and completion information. Such data were maintained in a manual record keeping system or a computerized record keeping system to which the FAA had access. Individual qualification records were not unique to AQP. This meant that previous data that were stored prior to starting an AQP could have also been used toward the AQP, as long as they met the FAA requirements under Part 121 and 135. Such information, for example, included the last proficiency check, last medical examination record, and flight hours in a particular aircraft (FAA, n.d.b).
2. Performance/proficiency data: These kinds of data were considered de-identified data and were maintained separately from the individual qualification records. They determined the long range trends and supported

validation and improvements by tracking crew members performances (FAA, n d b)

The purpose for the data collection has been to evaluate the overall performance of the airline's AQP and validate their curricula by identifying trends in a nonpunitive manner for the flight crew If any flaws have existed in the program, modifications could have been implemented The entire process has then been prepared again in the event any further improvements could be made (FAA, n d d)

CRM

For the past 25 years, CRM has been utilized by many airlines and training academies in an attempt to increase the levels of safety and improve flight crewmember performance There have been complications in understanding pilots' behavior and the root cause of "pilot error" in the evolution of CRM

CRM has been defined as "the effective utilization of all available resources, hardware, software, and liveware – to achieve safe, efficient flight operations" (Gregorich, Helmreich, & Wilhelm, 1990, p 682) As the CRM concept has been recognized worldwide, and mandated for many operators in several countries, the industry has begun to view CRM from a different perspective that includes pilots, dispatchers, and maintenance personnel (Macleod, 2005) Today, the CRM concept has been utilized in various departments of the airlines to ensure safer operations

The manner in which crews have performed and their level of effectiveness could have been viewed through a systematic approach that would explain the process behind their actions and outcomes Tsang and Vidulich (2003) explained the Input-Process-Outcome (IPO) model as seen in Figure 12, and how each factor could influence the overall safety of the flight. The Input Factor consisted of all the given inputs pilots possessed, such as characteristics, physical condition, national culture, and composition. These factors could have significantly affected interpersonal communication and skills among the crew. A cultural difference, for example, was considered a significant aspect. This has been noteworthy in countries, such as Japan, where superiority is culturally respected. In such a culture, FOs tended to hesitate if they questioned their Captains' (superior model) capabilities and decisions.

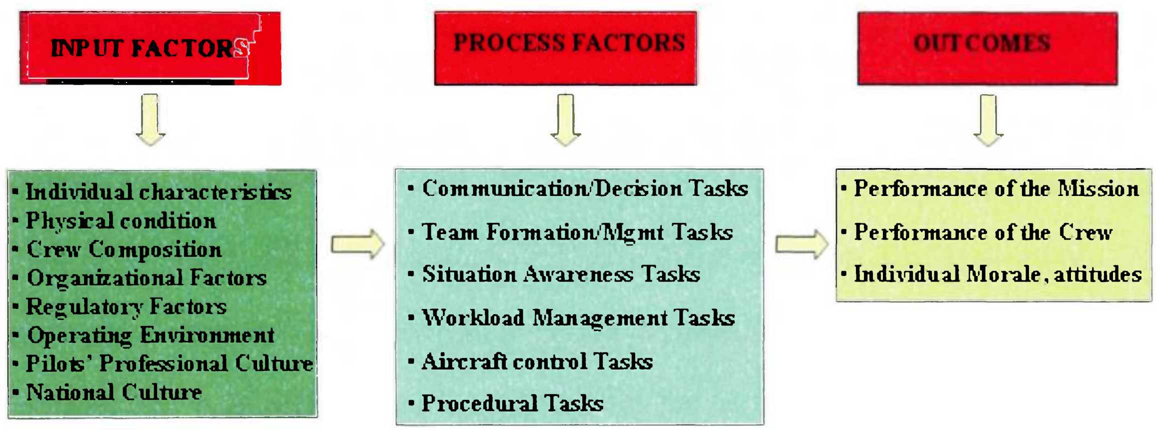

Figure 12. Input-Process-Outcomes (IPO) Model (Adapted from Tsang & Vidulich, 2003).

The Process Factors involved the crews' actions as a result of a particular situation. These actions included aspects such as communications between the crew, task management, aircraft control tasks, and procedural tasks. According to a study conducted by Foushee, Manos, Kanki, and Palmer, the better the communication skills existing among crews, the fewer the chances for error (Tsang & Vidulich, 2003). Hence, the more the crews interacted and shared information, the higher were their performances.

A consequence of all the factors possessed by the crews (Input Factor), and the course of action chosen and implemented by them, was the Outcome. The entire IPO model could have been viewed as a domino effect type of event. It started by having highly standardized qualifications, fine personality, and a good operating environment. If all these characteristics existed among the crews, then their performance and decision making process (Process Factors) during abnormal situations, would have led to highly effective outcomes and safer operations. However, if these characteristics were the opposite, then an adverse outcome may have jeopardized the flight (Tsang & Vidulich, 2003).

Recursiveness involved factors beyond those in the IPO model. It has been viewed as the future effect of outcomes on crews' attitudes and behavior. For instance, successful flights as a result of the crews' high performance and skills will "lead to positive morale, improved attitudes, and favorable team climate" (Tsang & Vidulich, 2003, p. 481) that will also have a positive effect on future flights. On the contrary, performance that resulted in precarious situations could have resulted in negative attitudes and weak performance in future flights. The presented factors were viewed as very important and were taken into consideration in training CRM concepts and techniques (Tsang & Vidulich).

Attitudinal Effects on Crew Performance

What many referred to as "pilot error," has been viewed as a broad-based category used to encapsulate many vague factors that have contributed to accidents and incidents. Understanding the chain of events that led to an accident involved the crews' personalities and attitudes, airline operations, and the airline environment. These variables affected the interaction between personnel and the departments within the organization (Helmreich & Wilhelm, 1991).

As previously mentioned, crew attitude has played a major role in the process of performing effectively and ensuring the safety of the flight. As a result, several studies were conducted to investigate crew attitude and understand how it was impacted by various factors. According to Helmreich and Wilhelm (1991), attitudes could be affected by organizations. In other words, an airline's regulations and operational procedures were viewed as viable factors that could alter the crews' attitude. If these factors were not well absorbed, understood, or accepted by the crew, then their attitudes were affected negatively, impacting crewmember performance (Helmreich & Wilhelm).

In an attempt to study attitudinal effect, the Cockpit Management Attitudes Questionnaire (CMAQ) was developed. It measured three domains: Communication and coordination, command responsibility, and recognition of stressor effects. Taking these domains into consideration, Helmreich and Wilhelm (1991) developed a study that involved an evaluation questionnaire that was filled out by crews before and after CRM training. This approach helped in obtaining data that illustrated attitudinal shifts due to CRM training and its effects on crew attitude (Helmreich & Wilhelm).

Figure 13 has presented the response of crewmembers from two major airlines prior to CRM training. Less than 10% thought of it as a waste of time and slightly useful, while almost 50% thought of it as a very useful technique. On the other hand, Figure 14 has presented the attitude of pilots toward CRM after they have been exposed to the program. The number of pilots who disagreed with the program dropped significantly. And the number of pilots who strongly agreed with the program and thought of it as useful to flight safety had increased to approximately 70%. Shifts in pilots' attitudes before and after CRM training indicated that the techniques used by airlines had changed flight crew's attitudes toward CRM and made them believe that it was beneficial to flight safety. The shift in pilots' attitudes could have been due to the way in which airlines approached training concepts (Helmreich & Wilhelm, 1991).

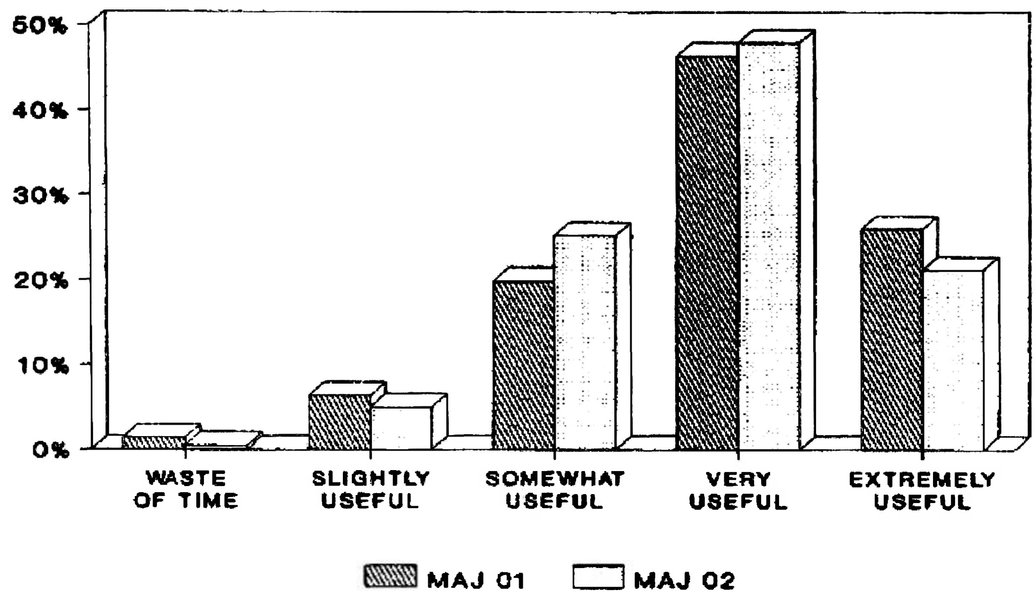

Figure 13. Pilots' Attitude Prior to CRM Exposure (Adapted from Helmreich & Wilhelm, 1991).

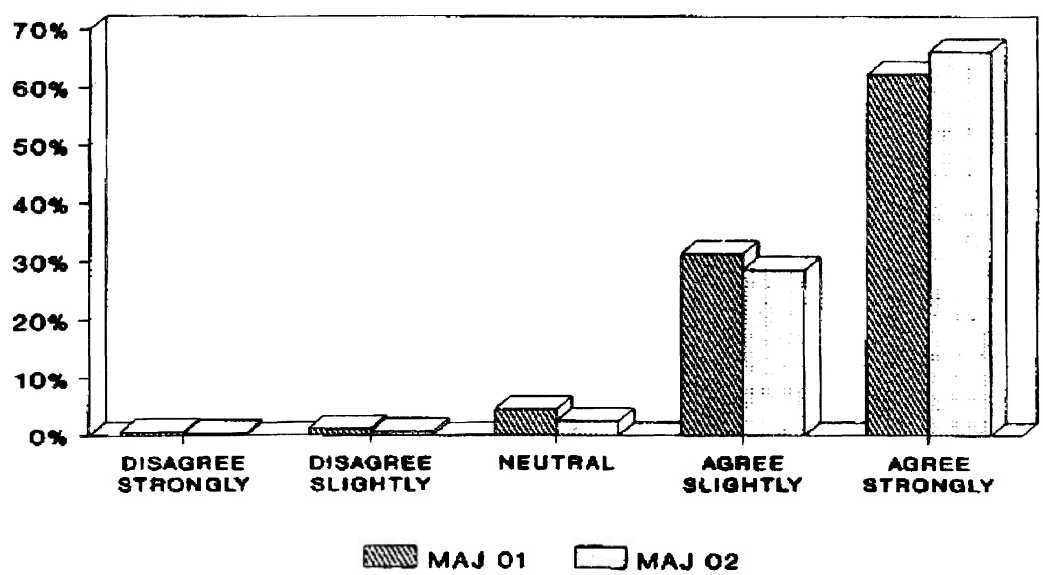

Figure14. Pilots' Attitude After CRM Exposure (Adapted from Helmreich & Wilhelm, 1991).

Pilots' personalities also played a significant role in attitudinal shifts Pilots with "pride in profession and a liking for the job" (Helmreich & Wilhelm, n d , p 1) were prone to accepting new concepts and techniques that were believed to enhance their performance and skills

Cultural Effects on Pilots' Recognition of CRM Concepts

Another topic connected to attitudinal behavior has been referred to as culture Culture has been defined as "the collective programming of the mind which distinguishes the members of one group from another" (Hayward, 1997, p 1) Several factors could have affected an individual's culture, some of these factors may have included the way a person was nurtured and brought up, the surrounding environment, and surrounding cultures From an aviation point of view, there were four types of cultures professional culture, organizational culture, safety culture, and national culture (Helmreich & Wilhelm, n d)

Professional culture was explained as the pilots' expression toward their job If they liked their job and their operating environment, then they showed a sense of professionalism and respect toward it Some of the factors that could have affected pilots' professional culture were stress, fatigue, and personal problems All these factors could have altered attitudinal behavior As a result, pilots lost interest in new concepts such as CRM, and their performance degraded This possibility necessitated that all pilots attained capabilities that would have enabled them to handle such factors Some pilots may have had negative attitudes and rejected new concepts because they believed their performance and skills were limited Airlines could have helped their pilots cope with such factors through the implementation of new safety programs that would have improved pilots' performance (Helmreich & Wilhelm, n d)

Organizational culture has been viewed as the surrounding traditions and attitudes within an organization The level of communication and concern between management personnel and employees, the airlines commitment to safety rather than profitability, and the enhancement of resources available to all their departments, have all had a direct impact on organizational culture In other words, the culture among all the departments in the airlines and not just what happened on the flight deck has been referred to as an organizational culture (Helmreich & Wilhelm, n d)

Safety culture was explained by Helmreich and Wilhelm (n d) as the airlines' concern about the safety level of their operations An airline with high ethical standards and comprehension of the importance of safer operations represented a positive safety culture Such airlines would have developed safety departments to implement and evolve new programs that would have enhanced their operational safety On the other hand, an airline with the sole goal of higher profitability would have faced complications along its operations Such an airline would have eventually lost the confidence of the traveling public and market share (Helmreich & Wilhelm)

National culture has been considered the most important type, as it related directly to the way crews interacted and performed their duties on the flight deck As it was mentioned previously, diverse cultures may have created differences between the crew on the flight deck, which may have led to further complications on how flight operations were performed National culture was defined as the type of culture one adopted from surrounding environments, religion, or even the way a person was brought up and nurtured. Hayward (1997) mentioned two traits of national cultures Power Distance and the Collectivism vs Individualism type

The Power Distance Culture referred to the respect and unquestioning of capabilities a subordinate (FO) had for his/her superior (Captain) Whereas the second type referred to individuals who were either interdependent or independent In that case, those individuals did not need the assistance of any one and believed in their own capabilities (Hayward, 1997)

Flight operations in Japan were a good example of national culture where seniors and individuals with higher rankings were respected Japanese FOs showed respect for the seniority of the Captain and did not question the Captain's capabilities, even if the Captain committed an error To question the Captain would, in their culture, create an environment that would jeopardize the safety of the flight An individual who rejected the assistance of FOs and took complete control of the flight by making all the decisions was another example of national culture Such actions by the Captain would have left an effect on the FO's attitudes and behavior during future flights, compromising safety (Hayward, 1997)

Integration of CRM in an AQP

A major goal of AQP has been the integration of CRM and technical training into a single curriculum Both aspects have been equally identified, documented, and integrated for a proper implementation of a particular phase of a flight This integration has substantiated the necessary qualities required for a safer flight operation In order to assimilate CRM in an AQP, two aspects have been taken into consideration

1. Phase specific: This aspect has been innately associated with maneuver performance; for example, the usage of the after landing checklist and other maneuvers that needed to be conducted at the same time. The checklist tasks assigned to Pilot Flying (PF) and Pilot Monitoring (PM) and the way they were completed was considered a critical concept that must have been covered thoroughly in training stages (*Development and implementation of an AQP*, 2005).
2. Phase independent: This addressed the importance of activities that were necessary at various times throughout the flight, while attempting to equalize the workload between the crewmembers. Understanding these activities and executing them effectively could have affected the safety of the flight. For example, regardless of the phase of the flight, crew situational awareness must have been maintained. Pilots trained under an AQP have also been trained according to CRM concepts as they were gradually transitioned into airline operations (*Development and implementation of an AQP*, 2005).

FAA/Industry Training Standards (FITS)

Modular training has followed standards and operations specified by the FAA in the FARs and Aeronautical Information Manual (AIM). The number of hours required and the maneuvers to be conducted have been specified, but CRM and Single/Multi-Crew Training (SCT/MCT) have not been necessarily required. General Aviation (GA) pilots have been certified without having as wide an array of diverse training experiences as would have been provided by an AQP.

As a result, the FITS program was developed with the help of the FAA and a number of industry partners and institutions such as Embry-Riddle Aeronautical University (ERAU) and the University of North Dakota FITS has evolved with two main objectives The first objective, as was noted in Chapter I, has been to decrease the rate of GA accidents by introducing additional training concepts that will eventually improve pilots' skills and decision making processes The second objective has been to increase efficiency and standardization of pilot training through the introduction of new concepts such as Scenario Based Training (SBT, FAA, n d c)

GA training conducted in the U S has faced a number of problems that had been previously overlooked and could have been contributing factors to higher accident rates Many flight schools conducted training with emphasis on the known evaluation patterns of the person conducting the evaluation According to the FAA (n d d), traditional GA training has involved a number of maneuvers that would have eventually improved the pilots' skills and standards However, critical concepts were not emphasized such as Aeronautical Decision Making (ADM), Situational Awareness (SA), Risk Management (RM), and Single Pilot Resource Management (SRM, FAA, n d c)

The state of technology in the GA training airplanes has advanced significantly incorporating features that previously only existed in sophisticated airliners Today, a private pilot could fly a Cessna 172 SP with access to an Autopilot (AP), a GPS, and a Multi-Function Display (MFD), the use of which has not been required to be taught

The FITS training has addressed these concerns by emphasizing training on decision making such as ADM, SA, Weather Decision Making, and Automation Management It has also introduced SBT into the training program where pilots have been trained under scenarios rather than solely on maneuvers and expected emergency procedures The SBT has been planned to change and improve pilots' standards, habits, and behaviors by using active learning Pilots situated in real life scenarios have been expected to improve their decision making process (FAA, n d c)

A new approach to flight training designed to ensure the success of the flight and overall safety has been SRM Through SRM training, pilots have been trained to the highest level by means of understanding and managing all available resources Such resources have included the airplane navigation system, automation, and airplane control system(s) The SRM training has improved pilots' ability to accurately and efficiently manage those resources, and helped pilots identify and manage risks Execution of such levels of training has been expected to result in higher operational standards and increased safety levels (FAA, n d c)

Research Question

The review of the literature has included an extensive study of various U S safety programs and training concepts This path has structured the thesis to establish a clear understanding of what the UAE lacks in terms of flight training and aviation safety programs The research question has evolved to Will a new flight training concept, incorporating specific safety programs and components, support the Emiratization process through the selection and training of UAE nationals in a program guaranteeing high qualifications and proficiency levels that satisfy the demands of the Gulf Region's airlines (e g , Etihad Airways)?

Chapter III

METHODOLOGY

Review of the U S air carrier voluntary programs literature and the pertinent FAA regulations and guidelines revealed some existing acceptance of U S safety and training principles among air carriers in the Gulf Region Consequently, a detailed analysis of the FAA programs was undertaken for transfer to an airline ab initio training program in the UAE that would increase the percentage of UAE pilots in the airlines' workforces Additionally, one of the UAE airlines (the study utilized nondisclosure of the name) provided close cooperation for several months, including some training data The airline also allowed the author to actively participate in its new-hire pilot process

Mixed Methods

The ab initio program data provided by the airline consisted of its curriculum and current LTRs for 10 of their pilots in the program The nature of the LTR data was both quantitative and qualitative The quantitative data were managed and analyzed with SPSS® 13 0, the qualitative data were analyzed for deeper understanding of their meaning Wiggins and Stevens (1999) have described this mixed methods analysis as "a strong movement towards the application of a combination of strategies" (p 171)

Qualitative data have been considered to be a collected type of data that is flexible and richly descriptive These data have often been used as guidance to an area of special interest for the researcher Creswell (2003) has stated that "Qualitative procedures rely on text and image data, have unique steps in data analysis, and draw on diverse strategies of inquiry" (p 179) Interpretation/analysis of such collected data has involved the critical step of an explicit description of the participants and the surrounding environment

Alternatively, data collected and measured in accordance with a relatively well-defined measurement tool have been referred to as quantitative data ("Quantitative & qualitative thinking," n d) Usually, the collected quantitative data have been numeric and have referred to the performance or standards of the participants A special emphasis has been placed on the reliability and validity (the psychometrics) of the data collected The research environment, materials, tools, and procedures have all been considered as vital aspects to the success of quantitative data collection (Wiggins & Stevens, 1999)

Mixed methods has been used as an approach to validate conclusions and findings that were the result of various data collection techniques Mixed methods has involved a number of approaches that have helped the researcher with the process of analyzing data According to Creswell (2003), these approaches have included

1 Data transformation A process of quantifying the qualitative data through a process that has involved code building

2 Explore outliers Quantitative data analysis has often resulted in outlier cases among the participants Such cases have been further clarified by collecting qualitative data through various methods (e g , interviews)

3 Instrument development Building a strong, well-designed instrument, has been proven as an efficient technique for gathering qualitative data This instrument has been built with "specific items and themes for scales to create a survey instrument that is grounded in the views of the participants" (p 221)

4 Examine multiple levels This process has involved testing the reliability and validity of the study at different levels through the collection of qualitative and quantitative data along the process

Limited Quantitative Data

The data provided by the airline have been viewed as both qualitative and quantitative data The LTR evaluation sheets of 10 pilots enrolled in the airline's ab initio program were the source of these data Pilots' performances were evaluated by the airline's instructors in an Airbus A-320 Level D simulator Moreover, the pilots were evaluated on eight sections as stated in the airline's ab initio curriculum (refer to Appendix A) The evaluation process depended on the pilots' performance of various procedures and tasks that were covered under each section

LTR Entries

The LTR sheet (see Appendix B) consisted of different sections The first section included de-identified information and did not contribute to the study Such information included (a) pilot name, (b) license number, (c) medical expiration date, and (d) pilot proficiency check (PPC) expiration date One variable of the data under this section (evaluation date) was identified, thereby contributing to the analysis process

The second part of the LTR sheet included a greater amount of information that contributed to the analysis The data from this section included (a) section number, (b) take off (T/O) performance, (c) approach (APR) performance, (d) landing (LDG) performance, (e) overall section assessment, and (f) flight time Pilots were evaluated using a 3-point scale, the ratings were (a) satisfactory (S), (b) borderline (B), and unsatisfactory (U)

The third section of the LTR sheet consisted of space available for the instructor's written comments. Instructors' comments were specific to certain areas mentioned by the airline; these areas were the pilots' (a) technical knowledge, (b) handling ability, (c) crew coordination, (d) situational awareness, (e) radio/telephony (R/T) procedures, (f) standard operating procedures (SOPs) application, (g) attitude, and (h) general performance. Comments denoted by the instructors were treated as qualitative data. Comments attributed to weak performance were noted and related to quantitative data for analytical purposes.

Descriptive Data and correlations

Data from the second section of the LTR sheets consisted of 18 variables that were coded and input to the SPSS® software for analysis. Pilots' data were arranged randomly and the order in which they were input was immaterial. Table 1 has been created to match the 18 variables with the data gathered from the LTR sheets. (The significant number of missing values has been addressed in Chapter IV.)

Table 1

SPSS Data Sheet

TH	TP	S1H	S1S	S2H	S2S	S3H	S3S	S3AH	S3AS	S4H	S4S	S4AH	S4AS	S4BH	S4BS	S4CH	S4CS
325.5	8	14.9	3	13.0	5	6.1	1	91.1	25	29.4	7	70.0	14	7.2	1	93.4	17
483.0	9	17.8	3	16.0	4	6.3	1	184.3	36	18.8	4	117.6	22	6.9	1	109.0	19
229.9	7	18.0	3	10.0	2	88.3	18	42.2	8	70.6	11						
372.5	5	24.4	5	7.7	3			129.8	32	26.1	6	64.8	16	2.0	1	116.0	16
54.5	4	16.0	3	10.5	2	28.4	7										
129.5	6	18.5	3	16.0	2	95.3	17										
54.5	3	14.4	3	8.4	2	32.0	6										
248.1	7	15.1	4	9.7	2	91.1	19	49.9	9	82.3	16						
344.1	8	19.5	4	23.9	5	2.4	1	97.4	23	45.6	11	60.3	11	6.8	1	88.2	16
313.4	8	19.5	7	15.0	2			89.4	19	29.2	9	70.9	10	5.9	1	83.9	18

Furthermore, Table 2 has been developed to illustrate each of Table 1's variables code and its explanation

Table 2

Variable Coding

Variable	Label	Meaning
TH	Total Flight Hours	Total flight hours flown by ab initio pilots in the A-320 simulator
TP	Training Period	Period of time each pilot spent in the program (in months)
S1H	Section 1 Hours	Total number of hours flown by each pilot in section 1
S1S	Section 1 Sessions	Total number of flight sessions flown in section 1
S2H	Section 2 Hours	Total number of hours flown by each pilot in section 2
S2S	Section 2 Sessions	Total number of flight sessions flown in section 2
S3H	Section 3 Hours	Total number of hours flown by each pilot in section 3
S3S	Section 3 Sessions	Total number of flight sessions flown in section 3
S3AH	Section 3A Hours	Total number of hours flown by each pilot in section 3A
S3AS	Section 3A Sessions	Total number of flight sessions flown in section 3A
S4H	Section 4 Hours	Total number of hours flown by each pilot in section 4
S4S	Section 4 Sessions	Total number of flight sessions flown in section 4
S4AH	Section 4A Hours	Total number of hours flown by each pilot in section 4A
S4AS	Section 4A Sessions	Total number of flight sessions flown in section 4A
S4BH	Section 4B Hours	Total number of hours flown by each pilot in section 4B
S4BS	Section 4B Sessions	Total number of flight sessions flown in section 4B
S4CH	Section 4C Hours	Total number of hours flown by each pilot in section 4C
S4CS	Section 4C Sessions	Total number of flight sessions flown in section 4C

As depicted in Table 1, the majority of the variables used for analysis consisted of pilots' performance under particular sections Even though the pilot performance levels were graded using a 3-point scale (S, B, and U), the individual performances were analyzed using the number of hours each pilot flew within each section The number of flights for each section was also added into the database and used to compare the 10 pilots A correlational analysis of the total number of hours for each pilot added to the analytical approach of the pilots' performance and the understanding of their proficiency differences

Participants

According to the airline, ab initio training has been defined as "pilots undertaking their first type-rating course on a multi-pilot aeroplane (MPA) " Pilots enrolled in the program were not necessarily inexperienced with 0 flight hours On the contrary, the airline has only been accepting pilots with a CPL and IR in a multi-engine aircraft Other airlines, such as Lufthansa, have defined the term ab initio differently and have been selecting pilots with no previous flight experience

The SOs term has traditionally referred to flight engineers, whose duties have consisted of monitoring flight status and providing assistance with flying the aircraft However, the airline has defined SOs as cadets enrolled in their ab initio program Once the cadets have completed the program their title is changed to FO (personal communication, October 15, 2006) Hence, the usage of the term in this study has been in accordance with the airline's definition

The participants in the study fulfilled all the initial requirements such as certifications and flight experience set by the airline As part of the selection process, all participants had to conduct a series of tests as required by the airline's ab initio training curriculum Hence, all were qualified and met the standards set by the airline that would 'provide reasonable assurance of success in both their ab initio training, and in subsequent training conducted during their career with the airline Additionally, all participants were subjected to a number of assessments prior to their enrollment in the program As stated in the airline's training curriculum, participants had to pass the following requirements to be accepted in the ab initio program

1. A psychometric and psychomotor assessment, conducted by the human resource department

2. Tests to assess the applicant's knowledge of the English language, and basic mathematical concepts and techniques

3. For applicants already holding a license qualification, an aviation theoretical knowledge examination intended to confirm that their level of knowledge is appropriate for the intended ab initio course.

4. A medical examination to assess the fitness of the applicant in accordance with the requirements specified by the GCAA, and in accordance with the medical and general health requirements specified by the airline

Age

Even though participants' age was not part of the data gathered, the airline has set a minimum age of 18 years and a maximum age of 30 years to gain acceptance into their program This requirement identifies the age range of the participants involved in the study Moreover, the participants' age differences did not contribute to the study and did not affect the results However, due to the flight requirements set by the airline, it was assumed that the majority of the participants were in their lower 20s

Nationality

The airline has clearly stated on their website that their ab initio program has only been offered to UAE nationals This nationality limitation has been viewed as an attempt to support the Emiratization process Hence, it was assumed that all participants were UAE nationals

Gender

The airline has not set any gender requirements Both male and female participants have been allowed to enroll in the program However, due to the low percentage of UAE national female pilots, it was assumed that the majority of the participants have been male pilots

Previous Flight Experience

As mentioned previously, the airline has only been accepting pilots holding a CPL with an IR in a multi-engine airplane According to the FAA's FARs, to be eligible to pass a CPL check ride, pilots must log a minimum of 250 hours of flight time (CFR, 2006) Depending on where the applicants have obtained their CPL, the number of hours might slightly differ Nevertheless, it was assumed that the majority of the applicants enrolled in the ab initio program held an average of 300 hours shared between a single and multi-engine aircraft

Qualitative Data

The majority of the qualitative data were obtained from the third section of the LTR sheets As previously mentioned, the LTR's third section included the instructors' comments on the SOs performance and standards The comments were reviewed and correlated to the SOs' poor performance on any of the aspects listed in the LTR sheet

Syllabus

The SOs training syllabus consisted of 11 phases that prepared the pilots for their initial line check The program has been initiated by a 23-day induction course, introducing the pilots to the airline's operations The SOs familiarized themselves with the Airbus A-320 through a self study regime of the aircraft systems Moreover, a series involving Computer Based Training (CBT), a Maintenance and Flight Crew Training Device (MFTD), and Full Flight Simulation (FFS) has been applied throughout the 23-day period

Ground school has consisted of systems study via a presentation format, Appendix C has listed all the systems that have been part of the course Moreover, the SOs have been required to review selected aircraft systems prior to each MFTD session (Appendix D has listed the number of systems to be reviewed before each MFTD session) The SOs have been expected to familiarize themselves with the normal and abnormal operations of the selected systems in each MFTD session

The FFS phase has consisted of a 10-day period that has focused on a number of procedures and malfunctions as depicted in Appendix E The program has also included Safety and Emergency Procedures (SEP) and CRM training that has lasted 2 days each, 8 hours each day Moreover, Zero Flight Time Training (ZFTT) has been incorporated in the training curriculum and has included a sequence of visual circuits as displayed in Appendix F The ZFTT training has lasted 2 hours

Evaluators and the Evaluation Process

According to a representative from the airline, the instructors utilized for the evaluations of the SOs' performances have not received measures to address calibration or standardization (personal communication, October 15, 2006) Hence, instructors have been using their own judgment to evaluate the SOs However, in accordance with the airline's Line Training Guidelines (LTG), the instructors are expected to perform as follows

1 During the early stage of this training, the instructor must concentrate on giving as much handling under visual conditions as possible This will include joining visual circuits from the downwind position or the base leg position Whenever possible, and commensurate with weather and ATC requirements, the trainee should, in the early stages, handle the aircraft by visual references, developing his planning and forward thinking, so as to place the aircraft in the pre-briefed position at the correct speed and height Instructors should demonstrate this handling technique during section 2, and the trainee should apply this training during sections 3 and 4

2 Instructors must strictly adhere to company standard operating procedures (SOP) If it is necessary to deviate from SOPs for a valid reason, or if you wish to cover some aspect that is not governed by SOPS, then this should be clearly explained to the trainee in order to prevent confusion and to enable him to benefit from the experience

3 SOs are encouraged to manually fly the airplane, but not after a long tiring night flight or in poor weather conditions

4 Bearing in mind the stage of their training, SOs should be encouraged to brief for the type of approach they expect to execute at destination However, the instructor should correct or modify the briefing in order to satisfy particular training requirements or to adhere to the syllabus

5 The SO must be briefed well in advance (and prior to TOD) if the instructor would like him to carry out any specific approach or exercise, bearing in mind the conditions in item 3 above

6 Refrain from unrealistically overloading a trainee by asking unnecessary questions, or by requiring the completion of a task outside his normal duties, during critical phases of flight

7 When asking questions, the intention should always be training and teaching If the SOs knowledge is poor, and he is unable to answer a question, allow him time to search for the answer in the manuals provided – this will help develop familiarity with the resources available to him as well as to increase his knowledge of a particular subject or discussion item As far as possible, avoid "spoon feeding" trainees with information

The instructors have been selecting different routes and approaches depending on what has needed to be covered under each section The SOs' duties have ranged from jump-seats to Pilot Not Flying (PNF) and Pilot Flying (PF) duties, where each duty has been covered accordingly The number of sectors under each section has been considered as a transition point to the next section If trainees have demonstrated satisfactory standards under each section, they have been transferred to the next section

There has not been a minimum number of hours set for each section However, SOs who have not demonstrated proficiency by the time they have reached the specified number of sectors have been board-reviewed They were then required to cover additional sectors for that particular section until they met the required standards If the SOs have not shown any further progress, they then were logged on a page referred to as the Red Flag Page (RFP) The SOs marked on the RFP have been considered to be poor in performance and required additional attention in order to demonstrate proficiency The SOs on the RFP have not transitioned into any sections until they have met the required standards

Simulator Costs

Since the pilots enrolled in the ab initio program had already obtained their CPL and IR, the airline has focused on training its pilots in the A-320 aircraft The airline has been utilizing the A-320 Level D simulators at CAE's Dubai Centre, UAE (personal communication, October 15, 2006) The instructors used for the simulator training have been provided by the airline, which has reduced the rental costs of the simulators and enabled airline standardization

Possible Sources of Error

As previously discussed, instructors who have evaluated the SOs were not calibrated. The only requirements followed were the LTGs that were prepared by the airline specifically for their ab initio program. Moreover, the LTGs were developed primarily as a training guide and have not standardized the instructors' evaluation thoughts on SOs' performances. The instructors have been assumed by the airline to have the right capabilities for evaluation.

Furthermore, the grading scale utilized has been one of three points. Though there has been a section for the instructors to leave comments, the grading scale has limited the instructors' categorical sensitivity. Through the utilization of this scale, the performances of the SOs may have been incorrectly documented and evaluated, thereby limiting the internal reliability of the grading.

Chapter IV

RESULTS

The SPSS® (13.0) provided a smooth approach toward analyzing the data. The software was used as a statistical tool to (a) divide the variables found in the LTR into several groups, (b) characterize each pilot with the number of hours flown, (c) develop a correlation between the number of hours flown by each pilot and their performance levels, and (d) help establish an understanding of how effectively the pilots handled the A-320 simulator.

As previously depicted in Table 2, the data from the LTR sheets were divided into 18 variables. Accordingly, the variables were then matched with each pilot to add-in the values. Only 3 of the 10 pilots had complete data for each of the variables; the remaining 7 pilots lacked certain records. This could have resulted from (a) incomplete information received from the airline or (b) pilots' termination from the program. This quantitative data has been further investigated throughout this chapter. Table 3 has displayed a summary of the hours flown by the SOs.

Table 3

Descriptives for Hours Flown by the SOs

	N	Minimum	Maximum	Mean	SD
Total	10	54.50	483.00	255.50	141.00

Statistical treatment was also applied to the instructors' comments. Additionally, pilots with poor performance, or a considerably higher number of hours, were treated with thorough qualitative review (see Chapter V). The comments for such pilots were evaluated to determine possible causes for their poor performances.

Since the first two sections contained complete information from all 10 pilots, these data provided some comparison. Pilots' were compared by the number of hours they flew, and the number of sessions they needed to complete sections 1 and 2. This was used to evaluate their initial performances and to estimate future performances. Table 4 has presented a summary of the descriptive analysis for section 1 and 2.

Table 4

Descriptives for Flight Hours and Number of Sessions for Sections 1 and 2

	N	Minimum	Maximum	Mean	Standard Deviation
S1H	10	14.4	24.4	17.81	2.99
S1S	10	3.0	5.0	3.60	0.84
S2H	10	7.7	23.9	13.02	4.90
S2S	10	2.0	5.0	3.10	1.29

Furthermore, two graphs were produced to aid in viewing the differences between the SOs under the given sections. Figures 15 and 16 have depicted two regression plots that display the differences between the number of hours flown and the number of sessions needed by each SO during sections 1 and 2. The two scatterplots have also assisted in identifying the outliers from both sections. The instructors' comments for the outliers were studied for possible SO weaknesses (see Chapter V).

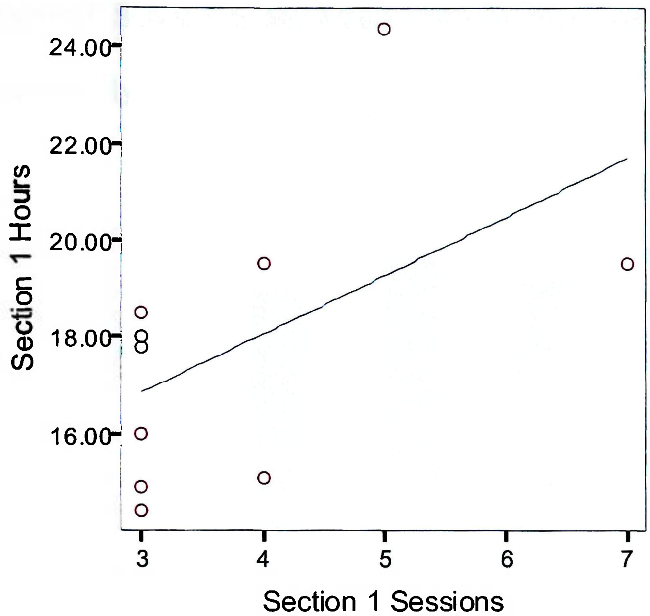

Figure 15. Section 1 Scatterplot, with Regression Line.

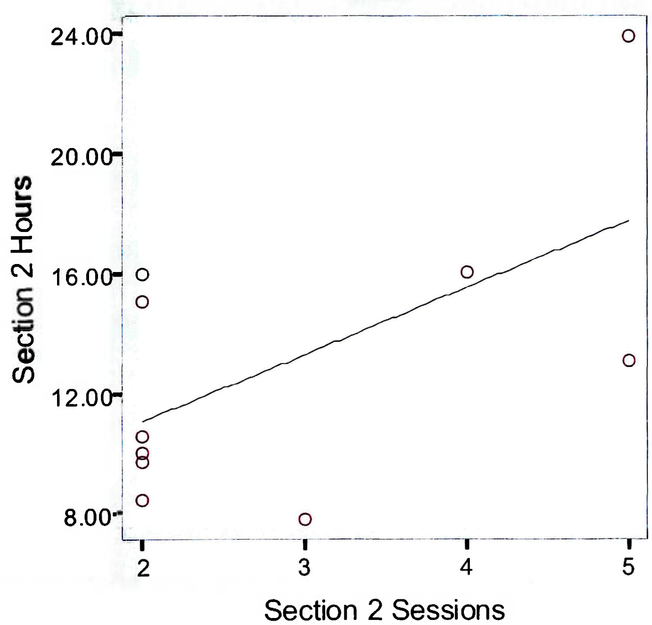

Figure 16. Section 2 Scatterplot, with Regression Line.

Figure 17 has depicted the number of hours flown by the SOs in section 3. As observed, SOs # 3, 6, and 8 had flown the most with 88.3, 95.3, and 91.1 hours respectively.

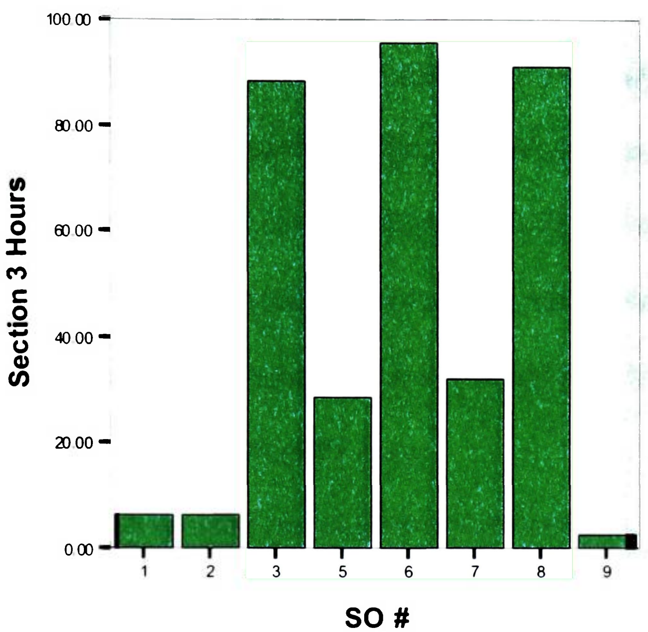

Figure 17. SO Hours Flown in Section 3.

The analysis of these quantitative results will be discussed in Chapter V. As per the mixed methods process, the discussion will also include analysis of the qualitative data from the LTRs.

Chapter V

DISCUSSION

After reviewing Table 4 and Figures 15 and 16 (see Chapter IV), those SOs with poor performance became evident In both sections, the weak areas of performance were located within the SA and R/T Procedures SO #4 was considered to be the outlier under section 1 The SO needed 24 4 hours and 5 flight sessions to complete the first section After reviewing the comments, it was found that the SO lacked basic skills Some of the comments by the instructors were

1 A bit slow but satisfactory at this stage

2 Must have a plan of what he intends to say before depressing mic

3 Must be more prepared for multi clearance

4 Combination of night and day flight, and first Pilot Not Flying (PNF) duties reflected on him as poor start Needs to be oriented in the seat and do not fall behind the aircraft

5 Borderline

Even though the SO was transferred to section 2, s/he was still weak at various aspects His/her first flight in section 2 included a number of comments that reflected his/ her performance

1 Needs improvement in SA

2 Must listen missed a few calls

3 Needs improvements in SOP applications

4. Needs to prepare more and to be ahead of the game all the time. Missed few R/T calls and should learn to listen and do two things at time.

According to Table 4 and Figure 16, SO #9 was viewed as the outlier within section 2. The SO struggled through certain phases of the flight mainly due to weak knowledge attributed to an apparent lack of preparation. The comments given by the instructors were:

1. Satisfactory but must start reading.
2. Satisfactory for stage. Must read books.
3. Satisfactory. Must use proper phraseology. Needs to be more disciplined.
4. Good start of PNF stage. Satisfactory. Standard for his stage. Behind aircraft on busy approach. Debriefed on minor points. Must study SOP. Read books.
5. Satisfactory. Must learn to calculate top of descent.

After a few interpretations of the comments given to SO #9, it was clear that s/he lacked technical knowledge and was behind the aircraft on several occasions. However, his/her knowledge and performance improved as s/he progressed to section 3.

Moreover, SO #s 1, 2, and 9 had complete data throughout the eight sections. Their data were statistically analyzed and compared to identify any differences between their performances. Table 5 was created to display the 18 variables for the three SOs (#s 1, 2, and 9).

Table 5

Data for SO #s 1, 2, and 9

TH	TP	S1H	S1S	S2H	S2S	S3H	S3S	S3AH	S3AS	S4H	S4S	S4AH	S4AS	S4BH	S4BS	S4CH	S4CS
325.5	8	14.9	3	13.0	5	6.1	1	91.1	25	29.4	7	70.0	14	7.2	1	93.4	17
483.0	9	17.8	3	16.0	4	6.3	1	184.3	36	18.8	4	117.6	22	6.9	1	109.0	19
344.1	8	19.5	4	[illegible]	5	2.4	1	97.4	23	45.6	11	60.3	11	6.8	1	88.2	16

As highlighted within Table 5 SO #2 required more flight hours in three sections, SO #9 required somewhat higher flight hours for two sections For additional clarification and understanding of the major differences, the LTR sheets were reviewed and the instructor comments were analyzed

The major hour differences for SO #2 were explained by the instructors' comments in the LTR The comments revealed that a month-long discontinuation of training probably resulted in the need for additional time to gain proficiency Also within the comments were numerous weak points that SO #2 exhibited during the early stages of the training program One of these weak points was viewed as the main cause for poor performance by SO #2 – a lack of confidence Due to this low self-confidence level, SO #2 was poor in SA, Crew Coordination, and decision making, these combined factors resulted in the pilot falling behind the aircraft

Improvements were recommended by the instructors in the following areas (a) R/T procedures, (b) instrument scan, (c) SA, and (d) Crew Coordination There were a few occasions when SO #2 became disoriented and confused, resulting in a poor approach and the subsequent landing procedures Some of the comments given by the instructors were

1 A lot of ATC calls are missed or not understood

2 Needs to improve on instrument scan

3 Needs to improve scan and build up his/her confidence

4 Good on all phases of the flight except approach were s/he fell behind the aircraft sometimes Need to improve SA with high workload

Despite all the weak points, "his/her attitude is positive and eager to learn " SO #2 progressed in flight training and demonstrated proficiency, despite needing more flight time to achieve the required standards

Similarly, the comments for SO #9 under section 4 were reviewed to attain a better understanding of what contributed to the extra hours The following comment was provided by one of the instructors "If faced with new scenario his/her SA drops allowing aircraft to deviate and needs prompting to wake up Jerky at time and does not anticipate correctly with slow instrument scan Technical knowledge is still marginal "

As previously discussed, the data indicated that, SO #9 was still facing some of the problems from the previous sections Improvements continued to be necessary in several areas (a) R/T Procedures, (b) SA, (c) Technical Knowledge, and (d) SOP Applications Nevertheless, SO #9 has been viewed as a pilot who is eager to learn and has the right attitude

The rest of the SOs did not have complete data in their LTR sheets This was primarily because of their training status The last flight on their LTR sheets were recorded in September 2006, and the data were received by the end of that month It was not possible to obtain any updates on their training, however, some of the available data contained some interesting facts

The LTR comments indicated that some SOs had difficulty with certain aspects of the initial flights but showed progress by the end of the section and had demonstrated the required standards The following is a list of the weak areas encountered by the SOs

1 R/T Procedures

2. SA

3. Crew Co-Ordination.

The remainder of the data indicated satisfactory performance. There were some cases where SOs struggled through certain aspects, as previously mentioned; however, they eventually managed to overcome their weak areas and reached the required levels of proficiency. After reviewing the LTR sheets, it has been concluded that the SOs struggled with some rather specific aspects. Most of these aspects have been considered to be basic and could have been addressed during preliminary training stages. Such techniques need to be incorporated in future flight training to enhance the pilots' transition phases. These techniques include, but are not limited to:

1. R/T Procedures.
2. SA.
3. Crew Coordination.
4. Ability to absorb technical knowledge.
5. Familiarity with disorientation.
6. Task management.

The analysis of the LTR sheets was a success in determining some of the weak areas that current SOs exhibited. The results of this study can contribute toward the improvement and development of existing and future flight training programs in the UAE.

The quality of training at the preliminary stages (i.e., private and commercial pilot level) could have been the leading cause of the SOs' poor standards. Additional information on the SOs' previous training would have assisted in developing a more concise conclusion concerning their performance. Furthermore, this chapter discusses additional information on the airline's selection process, as well as training improvements needed to enhance and ease proposed airline training phase processes.

Pilot Selection Process

The airline's pilot selection process has begun by selecting candidates who have applied through the airline's website and have met all the requirements. Invitations have then been sent to the selected pilots for a scheduled interview. The airline has been interviewing 10 pilots every month, with a pass rate of approximately 40%. The following assessments have been conducted during the interviews:

1. First psychometric test (approximately 100 questions).
2. Second psychometric test (approximately 299 questions).
3. Technical knowledge (approximately 50 questions).
4. Team work assessments (two 5-minute projects).
5. Individual interview (30 minutes).

The first two psychometric tests have been psychological multiple choice questions designed to draw a better picture of pilots' personalities. There have been no right or wrong answers; interviewees have been asked to answer these questions honestly and without thinking of the answers, as this has helped the interviewers draw a better picture of the pilots' personalities.

Following the two psychometric tests, the technical knowledge test has consisted of questions relating to a wide range of topics, including: (a) aerodynamics, (b) maneuvers, and (c) weather. This test has consisted of multiple choice and short answer questions that have been direct and to the point. The main goal behind this test has been to not confuse the candidates or stress them. Nevertheless, the questions have been constructed in a way that would not cause the interviewees to ponder, but would check their knowledge level The pilots have been given 30-45 minutes to finish the test

The pilots have then been divided into two groups where they have been assigned two tasks The two groups have been given 5 minutes on each task, and been regrouped between tasks Observations have been conducted on each group by the interviewers, notes were recorded on pilots' behavior, team work ability, and decision making process The tasks have been very simple and required no experience with a specific field or topic The main goal behind this assessment has been to assist the interviewers with narrowing down the selection process to pilots with (a) leadership skills, (b) higher team work orientation, and (c) stronger decision making skills

The selection process has then concluded with a 30-minute individual interview with each pilot The interview has consisted of direct and easy questions that pertained to the interviewees' interest in aviation

The airline's website has stated that their ab initio program is for UAE nationals only However, due to the low number of UAE national pilots, the airline has been obligated to accept applications from other nationalities According to an airline representative, there have been three UAE national pilots in their ab initio program, and only two operating on the line (personal communication, October 14, 2006) The author was invited to an interview on August 15, 2006, and it was noted that he was the only UAE national pilot in the interviewee group The remaining 9 pilots were from the following countries (a) Egypt, (b) India, (c) Iran, (d) Jordan, (e) Scotland, and (f) Sweden

Interpretation of Evaluation Records

The 10 pilots whose LTR evaluation sheets were analyzed and reviewed were all experienced pilots with a CPL, IR, and MER The poor performance noted from some of the pilots could have been due to the quality of training received prior to enrolling in the airline's ab initio program For example, even though the ab initio curriculum has not emphasized R/T procedure training, a number of pilots conducted these procedures within standards, while others conducted this procedure poorly and required extra training

The following sections have focused on reviewing the airline's training curriculum and incorporating additional training in the areas in which the SOs performed poorly Such areas are not necessarily limited to airline level training Hence, these areas should also be further improved at an earlier training level (e g , flight schools and training centers)

Programmed Hours

The airline's curriculum has been focused on training the SOs on the A-320's aircraft systems, normal, and abnormal procedures (refer to Appendixes C, D, and E) The MFTD and FFS sessions have been used to train the SOs on the A-320 simulator and familiarize them with the cockpit As previously discussed in Chapter III, the SOs have been graded with a 3-point scale on their takeoffs, landings, and approaches into selected airports As previously discussed, the comments have been used to evaluate the SOs on their standards in various areas Moreover, the curriculum has not described any training schedules for any of the areas of weak performance by the SOs (i e , R/T procedures, SA, and Crew Coordination)

According to the curriculum, CRM training has been part of the training topics (refer to Appendix E). As a result, CRM has not been one of the weak areas of SO performance. It has appeared that both the airline and the SOs would benefit if the curriculum were modified to include additional training areas to improve SOs' performance to standards.

Results of Qualification Evaluations

The analysis of the LTR sheets has revealed a number of weak areas that have been viewed as a major setback to some of the SOs in the ab initio program. The fact that not all of the SOs have struggled with the same areas has indicated that the quality of the initial flight training could possibly be connected to performance less than standard at the time of receiving the airline training. Interpretation has been that it would be more effective to establish new training requirements that would add the requirements of training pilots to both a private pilot and commercial level.

Need for Additional Training

To date, the aforementioned additional training has been required in the areas of:

1. R/T Procedures.
2. SA.
3. Crew Coordination.
4. Disorientation.
5. Task management.

These noted weak areas of performance could be addressed by incorporating specific additional training modules in the curriculum. These additional modules would focus primarily on the areas of weakness and ensure that the SOs meet the required standards.

Chapter VI

CONCLUSIONS

There have been a number of movements in the aviation industry that are aiming toward developing new flight training techniques that would incorporate features overlooked by many training centers An industry-academia partnership that includes well-recognized institutions (e g , Cirrus Design and ERAU) has been aiming toward enhancing GA training This approach has been expected to reduce the number of GA accidents, as well as improve airline transition training The UAE lacks the fundamentals of the GA concept As a result, UAE government officials have been overlooking the importance of preliminary training and the fundamentals of GA activities in the country, the result has been a dependence on expatriate pilots for airline operations

Improvements and advancements in technology have resulted in the development of efficient and distinct techniques for airline flight training For example, a new training program has been introduced by the International Civil Aviation Organization that enables pilots to conduct flights as FOs with as low as 10 hours of solo flight time The new concept has been inaugurated to "address a global shortage of commercial pilots" (Hart, 2006, ¶ 6) This approach relies heavily on flight in the FFS, while incorporating airline type training throughout the program Pilots will be sent to the airlines in a shorter amount of time, with appropriate levels of knowledge This process has also provided a training curriculum that is less expensive (also requiring less time) than the traditional modular training program (Hart)

Training Program for the UAE

The flight schools and institutions at which the study's SOs obtained their CPLs and IRs were treated as proprietary information and were not among the study's data. The training performance of the SOs indicated that their initial flight training provided weak foundations that resulted in weak evaluations. As a result, major improvements of, and refinements to, the current UAE training programs are viewed as necessary to qualify pilots during assimilation of the advancements in today's aircraft technology.

Various training techniques have been utilized by numerous training centers worldwide. Some of the techniques depend solely on actual aircraft flight training (i.e., modular type training), and some rely heavily on training zero flight time pilots in flight simulators (e.g., the European ab initio programs). Unequivocally, both methods present advantages and disadvantages to the airline flight training scenario.

This analysis concludes that the most efficient approach to pilot training for the UAE airlines would be a combination of both aforementioned techniques, a proposed new program would combine some actual aircraft flight training with flights in the FFS. Via the utilization of TAAs and FTDs, a new flight program would be capable of delivering the highest level of standardized training to future UAE national pilots, while simultaneously increasing the number of national pilots in the country.

Globally, many pilots have initiated their aviation career with flight time in a single engine airplane, which has been universal in the modular approach. However, the proposed ab initio program views single engine airplane training as unnecessary, initial flight training should be conducted in a multi-engine airplane. The proposed hybrid ab initio program would send pilots through extensive flight training involving interrelated

TAA and FTD training concepts The resulting foundation for the FSS would comprise higher levels of the aeronautical basics demanded by the airline flight standards

This program's proposed training fleet would consist of the Piper Seminole multi-engine aircraft, along with its matching FTDs The fleet would additionally include an Airbus A-320 FFS that would be utilized for the jet transport transition phase, thereby completing the training of the pilots in jet operations associated with an airline Table 6 provides the framework for some of the cost estimates that would be necessary for the proposed initial training fleet, to some degree, it is summative of this study's conceptual hybrid ab initio program

Table 6

Initial Fleet Configuration

Device	Trainer Type	Quantity	Purchase Price
TAA	Piper Seminole	5	$2,424,500
FTD	Piper Seminole	5	$3,750,000
FFS	A-320	1	$10,000,000
Total		11	$16,174,500

Chapter VII

RECOMMENDATIONS

This study has concluded that the UAE government should inaugurate a flight academy that would support the demand for well-trained, high quality national pilots for the rapidly expanding airlines in the country The academy, in collaboration with the nation's airlines, would be formed to provide a highly standardized flight training program The program would offer a highly-structured curriculum (based on airline-style training) that produced qualified airline FOs

Integration of Aviation Safety Programs

The academy would integrate a number of safety programs in its training curriculum that would stimulate the UAE airlines to initiate these programs within their operations These programs would connect the academy with the participating airlines to establish a firm, continuous approach for zero flight time training of national pilots to the F/O seat of an airline jet transport These programs include a variety of features that would enhance future airline operations in the UAE The Airport Familiarization Program (AFP), the ASAP, FOQA, and LOSA are specifically recommended

AFP

The AFP has been viewed as a highly-advanced technological approach toward the enhancement of flight crewmember operations Through the utilization of an AFP, low-time FOs would conduct approaches into airports with much more confidence, while knowing what to expect at the airport. The AFP is a data-dependent software that produces 3-D animations of approaches into selected airports. The animation includes detailed information on several segments of the approach, capable of familiarizing the pilots who will fly the approaches. The information includes: (a) airline policies to selected airports, (b) airspace, (c) arrival routes, (d) ATC calls (real controllers with diverse accents), (e) cockpit instruments, (f) general airport information, (g) restricted areas, (h) runway details, and (i) terminal information (Treadway, 2006).

The proposed AFP software would be connected to a password-protected network, providing full time pilot access. This system would allow pilots to review the entire approach prior to a flight. Figure 18 demonstrates a 3-D animation of a Boeing 777 approaching an airport. As illustrated, the software displays the approach, including cockpit flight instrumentation and the projected airplane path. (Pilots would have a choice of other views for a more complete familiarization process.)

Figure 18. The Proposed AFP 3-D Software (Adapted from Flightscape, n.d.).

ASAP

The ASAP is a non-punitive safety program established by the FAA that encourages air carriers and repair station personnel to voluntarily share information about incidents that may have been precursors to accidents Each incident is reviewed to implement the appropriate corrective action(s), which can incorporate retraining (e g , the AQP, FAA, 1997)

FOQA

FOQA is an FAA voluntary safety program offered to all commercial airlines The goal behind the program is to improve the safety of commercial aviation through the generation of flight data during normal operations that would help indicate any deviations or exceedances during the flight The collection of such data produces performance trends that could help the airline identify weak links and implement the necessary corrective actions (e g , retraining or applying new standards, FAA, 2004)

LOSA

LOSA was developed as a method of obtaining data about the performance of flight crewmembers through cockpit observations during normal flight operations It was also described as "Getting an airline's cholesterol checked" (Helmreich, Klinect, & Wilhelm, 2001, p 2) Observations from the jumpseat have provided more accurate and reliable data that could possibly identify the strengths and weaknesses of an airline's safety operations Moreover, the quality of the obtained data depends to a great extent on the observers used for conducting the observations (Helmreich et al)

The FITS, AQP, LOSA, FOQA, and ASAP (FALFA) Model

The FALFA model was developed by the author to demonstrate a dynamic approach that integrates five safety programs within one operation. The model launches by introducing UAE national candidates into flight training through an extensive selection process. Once selected, candidates will initiate their flight training in the FITS program. This segment of training would conclude with the candidates transitioning to the next phase with qualifications and standards higher than a CPL/IR pilot who has conducted training in a modular type program. The candidates would then commence airline transition phase training in an A-320 simulator under the AQP curriculum. Once they completed this stage they would be transferred to the airline where they would receive additional training on an airline-selected jet transport.

Airline operations would involve the implementation of LOSA, FOQA, and ASAP, enhancing safety and high operating standards on the line. Any deviations or incidents by any of the pilots would result in transferring them to an AQP training session to regain proficiency. Moreover, curriculums would be reviewed for validations and improvements that would result in transferring pilots to an AQP session in order to eliminate existing deficiencies. Figure 19 illustrates a flow chart of the proposed FALFA model.

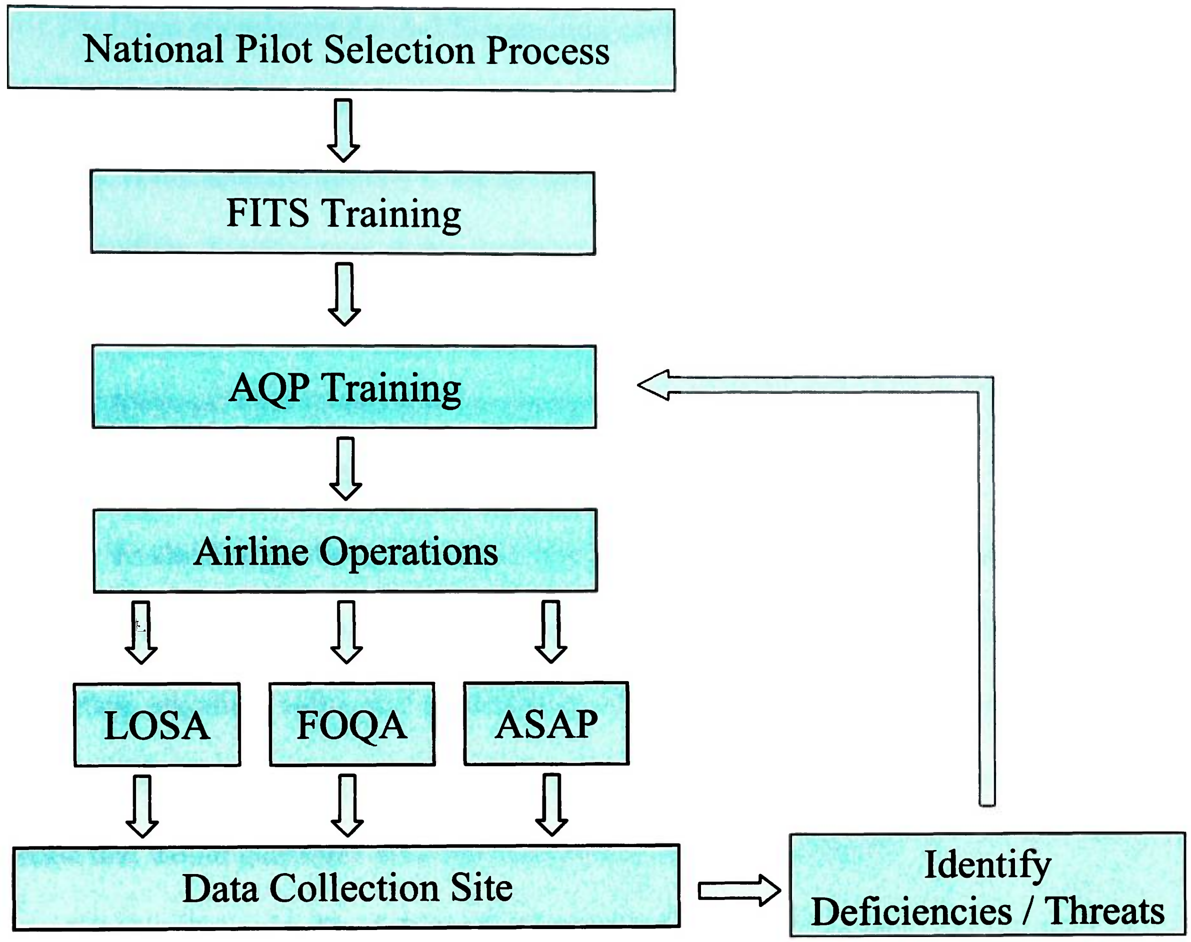

Figure 19. The FALFA Model.

Pilots who would undergo flight training according to the FALFA model are expected to graduate and occupy the right seat of an airliner in no longer than 2 years. Candidates would spend the first 9 months in the FITS program where they would obtain qualifications equivalent to those holding a CPL/IR in a multi-engine airplane. The following 10 months are viewed as the preliminary airline transition phase where they would receive flight training in an A-320 simulator, and ground school on the A-320 systems and operations.

Upon completing the A-320 transition course, candidates would be transferred to the respective airlines where they would spend the last 5 months training on a selected aircraft. If the selected aircraft is the A-320, then transition phases to the right seat would be immediate. Furthermore, if the academy enrolls 25 pilots every year, then the FALFA model is expected to increase the number of national pilots operating in the airlines (i.e., Etihad Airways) by a remarkable percentage rate within the first 6 years.

Reliable and Valid Evaluation Technique

Evaluation has been defined as "the systematic collection of descriptive and judgmental information necessary to make effective training decisions related to the selection, adoption, value, and modification of various instructional activities" (Goldstein, 1993, p. 147). Hence, it is important to develop a reliable and valid evaluation scale that would guarantee accurate measures of crew performance.

The 5-Point Gold Standard Evaluation Scale

When developing a scale, certain measures must be taken into consideration that would ensure the accuracy of the evaluation instrument. A 3-point, sensitive scale measure, such as the one used in the LTR sheets, may lead to unreliable evaluations of the SOs. A more sensitive scale that would incorporate five levels of measurement is recommended. Utilization of a 5-point scale as a gold standard referent would enable the instructors to perform a more reliable and valid evaluation process.

Calibration of Evaluators

A more accurate evaluation process would also include calibration of the evaluators and utilize the 5-point scale. The proposed calibration process would ensure the standardization of evaluators, minimizing the opportunities for evaluations by ultralenient or ultrastrict evaluators

Ab Initio Program

The academy would deploy a fleet of late model, well-maintained TAAs, equipped with state-of-the-art "Glass Cockpits" for primary flight training It would provide ab initio and advanced flight instruction through the use of advanced FTDs and a FFS, while employing a highly qualified staff of select flight instructors possessing corporate, civil, and military backgrounds The academy could be located at Al-Ain International Airport, Al-Ain, with a dedicated facility housing the entire operation, including the base for its modern fleet of aircraft and advanced simulation devices

The proposed academy would be designed to utilize the most up-to-date technologies to lower operating costs, maximize efficiency, and provide a high level of service and convenience The associated high level of safety and efficient operations would be paramount to assure the academy s acceptance and growth

Al-Ain International Flight Academy (AIFA)

A prestigious flight academy, AIFA, would be established with the goal of graduating highly-proficient, professional national pilots AIFA would provide contract specialized flight training for airline pilot candidates with exclusive relationships with the nation's airlines AIFA would also provide a viable alternative for UAE pilots who would otherwise be forced to travel overseas for flight training The academy would accomplish this by offering custom designed curriculums, validated by the contracted airlines

AIFA's competitive advantages would include the aforementioned fleet of late model, well-equipped, professionally maintained aircraft, advanced simulation, and an experienced management staff The academy would also conduct thorough, security background screening, during all phases of its candidate selection Security and safety would be of prime concern for all phases of the operation, with efficiency, effectiveness, and fiscal responsibility also being of high priority The level of professionalism would be, and must be, evident to all parties

Pilot Selection Process

UAE national candidates enrolling in AIFA would experience an exhaustive selection process that would ensure highly qualified FO graduates Acceptance to the academy would require a number of pre-requisites and academic skills, as follows

1 Age between 18 and 30 years

2 Possession of a high school diploma

3 Minimum score of 550 (213 for computer-based or 79-80 for internet-based) in the Test of English as a Foreign Language

4 Satisfactory knowledge demonstration of mathematics and physics

5 Satisfactory performance in psychometric and team work assessments

6 Satisfactory performance in a flight simulator (for those applicants with pilot certificates)

AIFA s Objectives

In order for AIFA to accomplish the aforementioned goals, the academy experience must focus on the following

1 Address the demand for airline pilots in the UAE and provide professional flight training at a level superior to that offered by global competitors

2 Implement a marketing strategy that would gain acceptance by the airlines and national pilot candidates, with future expansion of the market to include international pilot candidates and airlines

3 Attain profitability in a prescribed period of time

4 Acquire a modern fleet of training aircraft as well as state-of-the-art advanced flight simulation devices

5 Implement operations that would assist in the future development of AIFA both domestically and internationally

AIFA's Proposed Location

A thorough review of all airports located in the UAE resulted in Al-Ain International Airport being chosen as most appropriate for the location of AIFA The other five international airports considered were Abu Dhabi International Airport, Dubai International Airport, Fujairah International Airport, Ras Al-Khaimah International Airport, and Sharjah International Airport

Al-Ain International Airport is located at the northern outskirts of Al-Ain city, approximately 160 km east of the capital, Abu Dhabi, and the City of Gold, Dubai Because of its close proximity to two major cities in the UAE, and a low number of current flight operations, Al-Ain International Airport has been selected as the most desirable location for AIFA

AIFA's Mission

AIFA's mission would be to provide the airlines and individual pilot candidates with professional flight training in the UAE, utilizing a highly standardized, well-integrated, and state-of-the-art training program The academy would maintain the finest standards in aviation safety and security, it would thus become established and well recognized as an international center of aviation excellence, under the leadership of an exceedingly competent and experienced management team

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APPENDIXES

APPENDIX A

Line Training Overview

1.2 LINE TRAINING OVERVIEW

	SECTORS		DUTIES	COVER FO
	Minimum	SUB-SECTION		
Section 1	05	--	Jump-Seat	--
Section 2	05	--	PNF Duties	Yes
Section 3	35	Standard Procedures	PNF/PF Duties	Yes
Section 3A	15	Raw Data Flying	PF Duties	Yes
Section 4	30	Standard Procedures	PF/PNF Duties	Yes
Evaluation 4A	02	Progress Evaluation	PF Duties	Yes
4B	33	Standard Procedures	PF/PNF Duties	No
Total	125			

SECTION 1

05 Sectors (Min)- Aircraft
Familiarization with: • Flight deck layout • Company paperwork • Company Flight Envelope • Company Library • Flight deck Safety Equipment • RT Procedure

SECTION 2

05 Sectors (Min)- Aircraft
Familiarization with: • PNF Duties • RT Procedures • Completion of Flight Paperwork Navigation Log MET folder NOTAMS Operations Return • Completion of Company Flight Envelope

SECTION 3

35 Sectors (Min)- Aircraft
Proficient in PNF Duties
Proficient (all phases of flight) as PF in: • FCU Panel Selection • FMGC Operations
Introduction as PF to: • Proper Handling Techniques • Speed Control • Altitude and Thrust Coordination • Instrument Scan • Descent Profiles • Stabilized Approaches • Landing Techniques (incl Crosswind) • Situational Awareness • Forward Planning

SECTION 3-A

15 Sectors (Min) Aircraft
Introduction as PF to: • Raw Data Flying • Manual Thrust • Manual Flying

SECTION 4

30 Sectors (Min)- Aircraft
Proficient as PF in: • Proper Handling Techniques • Speed Control • Altitude and Thrust Coordination • Instrument Scan • Descent Profiles • Stabilized Approaches • Landing Techniques (incl Crosswind) • Situational Awareness • Forward Planning

SECTION 4-A

02 Sectors Aircraft(Progress Evaluation)
Evaluation of proficient as PF in: • Proper Handling Techniques • Speed Control • Altitude and Thrust Coordination • Instrument Scan • Descent Profiles • Stabilized Approaches • Landing Techniques (incl Crosswind) • Situational Awareness • Forward Planning

SECTION 4-B

33 Sectors (Min)- Aircraft
Consolidation of PF & PNF Duties
Demonstrate good understanding and application of: • S.O.P.'s • Operations Manuals. • All Aircraft Library Manuals • All Company required paperwork

FINAL LINE CHECK

02 Sectors Aircraft
Refer OMD (OMD Ref 5.6.7)

APPENDIX B

LTR Sheets

LINE TRAINING RECORD

Sheet No. ________

☐ Initial Section ____________ ☐ Upgrade ☐ New Hire ☐ LTCC

☐ Others (specify) ________________

Name:	Medical Exp. Date:	Staff No.:
License No.:	PPC Exp. Date:	Aircraft: A320
Rank:	Line Check Exp. Date:	Date:

Sec. No.	Duty	Route Sections		Type of Approaches & Modes				T/O	APR	LDG	Sec. Assess
		From	To	2	3						

Time	hr : min
	:
Carried FWD.	:
Total hrs.	:

1. Enter (S) Satisfactory - (B) Borderline - (U) Unsatisfactory or (AL) Autoland as appropriate for (T/O) Take-off, (LDG) Landing and (Sec Assess) Sector assessment.
2. Enter type of approach ILS, VOR etc.
3. (AP) Autopilot - (MAN) Manual (MNG) Managed - (ATS) ATHR Speed (ATO) ATHR Off - (SEL) selected - (M/FPA) Managed Nav/Selected FPA.

Instructor: ______________________ Signature: ____________________

Comments

Technical Knowledge:
Handling Ability:

Comments

Crew Co-ordination:
Situational Awareness:
R/T Procedure:
SOP Application:
Attitude:
General:

APPENDIX C

Ground School: System Study in Class Room

GROUND SCHOOL: SYSTEM STUDY IN CLASS ROOM	13:00 HOURS
CBT Introduction	0:20
Aircraft general	0:25
EIS-EFIS • EFIS presentation • PFD presentation • ND presentation	1:30
AUTOFLIGHT • System presentation • Flight control unit • Flight mode annunicietor • Flight guidance • Auto thrust • Flight Management • Rules regarding FM Navigation and F/PLN • Guidance principles • Protections	3:45
EIS-ECAM • EIS System presentation • ECAM system presentation	1:20
PNEUMATIC • System presentation	0:15
AIR CONDITIONNING • System presentation • Cargo System presentation	0:30
PRESSURIZATION • System presentation	0:15
VENTILATION • System presentation	0:10
COMMUNICATIONS • System presentation	0:20
APU • System presentation	0:10
ELECTRICAL • System presentation	0:25
CABIN PRESENTAION • System presentation	0:15
NAVIGATION • System presentation • ADIRS presentation • Radio navigation presentation • Standby instruments	0:50

FIRE PROTECTION • System presentation	0:10
ICE & RAIN • System presentation	0:10
HYDRAULIC • System presentation	0:10
LANDING GEAR • System presentation	0:10
FLIGHT CONTROLS • System presentation • Side stick • Normal Law & protection	0:55
FUEL • System presentation	0:20
OXYGEN • System presentation	0:10
LIGHTS • System presentation	0:10
RECORDERS • System presentation	0:05
DOORS • System presentation	0:10
POWER PLANT • System presentation	0:10

APPENDIX D

System Study before Each MFTD Session

System study before each MFTD session: 25 hours

MFTD 1 **ELECTRICA:** Normal operation A and B **FLIGHT CONTROLS:** reconfiguration laws – Normal operation A – B **APU:** Normal operation
MFTD 2 **FIRE PROTECTION :** Normal operation – Fire drills **FUEL:** Normal operation **POWER PLANT:** Normal operation A and B –Manual start
MFTD 3 **EIS – ECAM:** ECAM Normal operation –EIS reconfiguration **EIS – EFIS**: EFIS Normal operation **NAVIGATION:**EGPWS –Radio Altimeter-ATC/TCAS –Weather Radar - Normal operation A and B
MFTD 4 **AIR CONDITIONING:** Normal operation **PRESSURIZATION**: Normal operation **HYDRAULIC**: Normal operation **PNEUMATIC**: Normal operation
MFTD 5 **COMMUNICATIONS:** Normal operation **ICE & RAIN :** Normal operation **LANDING GEAR:** Normal operation **DOORS:** Normal operation
MFTD 6 **CABIN:** Cabin operation **LIGHTS:** Normal operation A and B **OXYGEN:** Normal operation
Before the following MFTD sessions, the trainee will study: the abnormal, Summary and quiz modules of the related ATA Chapter.
MFTD 7 **BLEED** **APU** **POWER PLANT** **FUEL**
MFTD 8 **ELECTRICAL** **HYDRAULIC** **EIS – ECAM** **EIS – EFIS** **NAVIGATION** **DOORS** **FLIGHT CONTROLS**

MFTD 9 **AIR CONDITIONING** **PRESSURIZATION** **VENTILATION** **AUTO FLIGHT** **FIRE PROTECTION** **LANDING GEAR**
MFTD 10 **COMMUNICATIONS** **CABIN** **ICE & RAIN** **OXYGEN** **LIGHTS**

APPENDIX E

SEP, CRM, and FFS Training

SEP

Day 2 (16:00) SEP School
See Appendix **R**

CRM

Day 2 (16:00)Classroom
See Appendix **N**

FFS

NO.	SESSION	DURATION	PAIRING
FFS1	NORMAL PROCEDURES	4.00	2 x Trainees
FFS2	NORMAL PROCEDURES	4.00	2 x Trainees
FFS3	ABNORMAL PROCEDURES	4.00	2 x Trainees
FFS4	ABNORMAL PROCEDURES	4.00	2 x Trainees
FFS5	ABNORMAL PROCEDURES	4.00	2 x Trainees
FFS6	ABNORMAL PROCEDURES	4.00	2 x Trainees
FFS7	ABNORMAL PROCEDURES	4.00	2 x Trainees
FFS8	(CFIT, TCAS , WINDSHEAR & LOFT)	4.00	2 x Trainees
FFS9	ZFTT	2.00	2 x Trainees
FFS10	Skills/Proficiency Check	4.00	CAPTAIN & F/O

APPENDIX F

ZFTT

ZFTT – (ZERO FLIGHT TIME TRAINING)

DAY1 (2.00) ZFTT
Sequence of Visual Circuits incl: • ILS Guidance • PAPI Guidance only • No PAPI or ILS Guidance • Manual Thrust • Single Engine Ops • Single Engine G/A • Single Engine Landing • Crosswind Take-Off • Crosswind Landing • Pilot Incapacitation
Use of TRK/FPA
Visual Circuit Pattern
Touch & Go Procedure

SKILLS TEST

Day1 (4:00) FFS
GCAA Skill Test

AIRCRAFT BASE CHECK (IF REQUIRED – REFER OMD 5.1.7.3)

Day1 (1:00) Aircraft
1 X Visual Circuit conducted by TRE with autoland and Full-Stop Landing
3 X 2-Engine Visual Circuits with 'Touch & Go' 3 X Circuits with A/THR 2 X Circuits without A/THR Incl: • ILS & PAPI Guidance • ILS only Guidance • PAPI Guidance • Without ILS & PAPI Guidance
1 X Simulated Engine Failure after Take-Off
1 X Simulated Engine Failure Visual Circuit with Go-Around from 200ft AGL
1 X Simulated Eng Failure Visual Circuit with Simulated Eng Failure Landing and Full-Stop