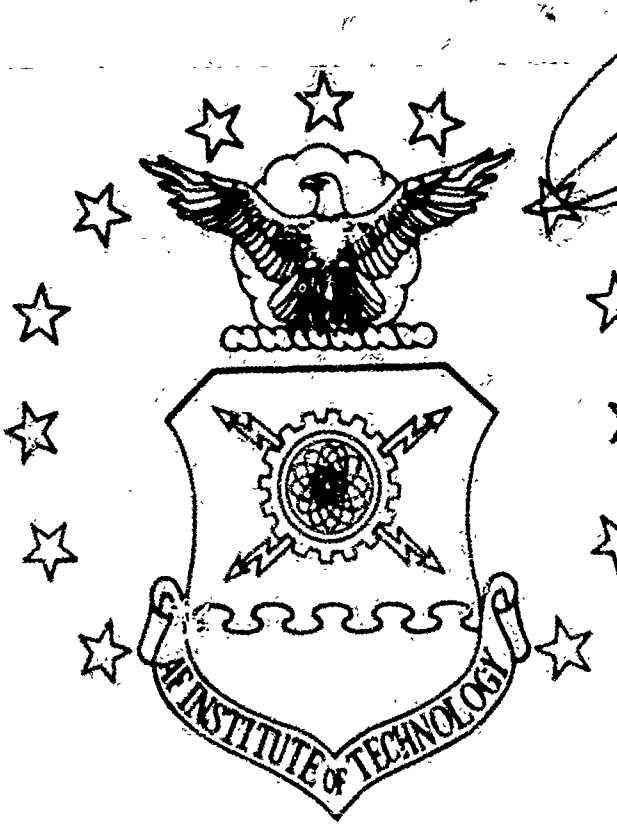

A COST MODEL FOR AIR FORCE INSTITUTE OF TECHNOLOGY PROGRAMS

John R. Cox, Jr., GS-12
Kerneth J. Hotcaveg, Major, USAF

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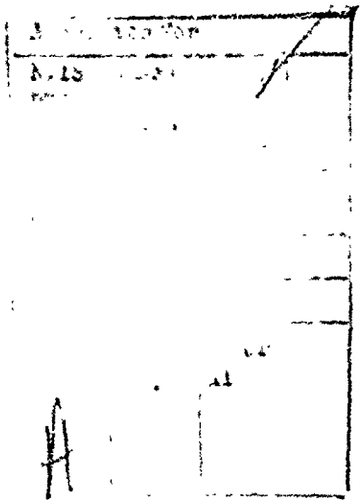

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This research developed a cost model to facilitate the accumulation of the full costs of individual AFIT education programs with fiscal year 1977 and 1978 data used to illustrate the model. Cost objectives, within the AFIT schools and programs, were identified for assignment of costs. Elements of cost applicable to the cost objectives were identified, defined, and categorized as direct, indirect, and other (student pay and allowances). The indirect costs of education were further subcategorized as AFIT indirect, base support, and command overhead. An additional cost category of unfunded retirement was included as a separate cost element. Using these cost categories, the cost per student week for each cost objective was determined. The modular composition of the cost model provides a high degree of utility, permitting the user to delete cost components if less than a full cost profile is desired. The model permits comparison and analysis of cost components, either in total cost or in cost per student week. Additionally, the model provides the basis for cost analysis as expense data become available in future years. Finally, the model provides a framework useful for analyzing costs of other educational activities.

LSSR 18-79B

A COST MODEL FOR AIR FORCE INSTITUTE OF TECHNOLOGY PROGRAMS

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

By

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CHAPTER I

INTRODUCTION

Statement of the Problem

Recently, there has been considerable interest concerning the costs of the various Air Force Institute of Technology (AFIT) education programs. There is presently no standard method for identifying, accumulating, or forecasting these costs. Therefore, a need exists to develop a standard model for identifying, accumulating, and forecasting the costs associated with educating students at the three AFIT schools, and through the Civilian Institution Programs. The proposed model should be useful for forecasting as well as collecting historical cost data. Inherent in this requirement is the need to identify appropriate cost centers. Additionally, the cost model should make maximum use of existing data sources such as the Air Force Accounting System for Operations.

Justification for Research

In past years, cost studies have been initiated by questions concerning specific AFIT schools or programs. The resultant studies were tailored to address these specific questions and did not provide a framework for a cost model

responsive to AFIT's reporting and control needs. The following is a review of the pertinent studies and analyses conducted in the past.

Air Force Program Review Committee Study

In May of 1972, the Air Force Program Review Committee (PRC) questioned the need for resident courses (18). The committee was particularly concerned about the apparent high cost of the School of Engineering resident programs. Following the PRC inquiry, the Commander of the Air University requested that AFIT

> . . . conduct a comprehensive study and analysis of the costs and benefits of AFIT programs, with particular emphasis on a comparative evaluation of degree programs conducted in residence and those attained from civilian institutions . . . [1:ii].

The resultant report, issued 18 September 1972, analyzed every facet of AFIT. Historical information dating back to 1964 was reviewed and actual expenditures for fiscal year 1972 were compiled.

The study identified a number of tangible benefits of the AFIT graduate programs. The areas highlighted included the contributions made by: graduate student thesis work, faculty research and consultation services, higher retention rates for officers completing AFIT resident graduate programs, and the responsiveness of the AFIT resident graduate curricula to Air Force skill requirements. In addition, the study group responded to the PRC's question

concerning the relative costs of graduate education through AFIT resident schools versus civilian institutions. The AFIT study group reported in September 1972 that AFIT compared favorably with civilian institutions offering similar programs. While the September 1972 report provided valuable insight into the problem of costing AFIT resident graduate programs, it did not address the costs of other AFIT programs (3).

Committee on Excellence in Education Study

Congressional interest led to an examination of the cost of officer training programs in the Fall of 1972 (38:1). In response to this increased scrutiny the Department of Defense (DOD) established a Committee on Excellence in Education composed of the Deputy Secretary of Defense, the Assistant Secretary of Defense for Manpower and Reserve Affairs, and the Service Secretaries (38:1). The Committee initiated an effort in March of 1974 to determine and evaluate the cost of officer training (22:1).

In the Committee's final report, dated 5 November 1975, it was noted that, "postbaccalaureate education must relate explicitly to the personnel management systems of the Services [22:1]." Management control systems must be responsive to the potentially substantive fluctuations that can occur under an environment of changing requirements. It was noted that a rise or fall in graduate degree

requirements could have a direct impact upon the enrollment levels in the various AFIT graduate programs. A responsive cost accounting system would be a requisite part of the management system needed to cope with such a dynamic environment.

The Committee also recognized the importance of "postbaccalaureate education short of a graduate degree [22:2]." The resultant greater emphasis on these non-degree programs has complicated the already difficult problem of identifying costs of the resident graduate degree education programs. Dealing with this problem will require a cost accounting model with sufficient resolution to distinguish appropriate cost allocation.

The Committee further observed that

> . . . the data maintained by the Services as a basis for gauging contributions (e.g., cost) of these (graduate) programs are generally presented in a fragmented fashion which invites skepticism . . . [22:5].

It was directed that a ". . . uniform methodology for determining program costs . . . [22:5]," be developed. The report by the Committee on Excellence in Education strongly implied that the continued existence of Service-operated educational facilities such as AFIT depended, at least in part, on the development of a responsive and uniform cost reporting system. As a result, a Graduate Education Cost and Manning Ad Hoc Committee composed of representatives from the Naval Postgraduate School (NPS), Office of the

Chief of Naval Education and Training, AFIT, and Air University was organized to address the problem (7:1).

Graduate Education Cost and Manning Study

The goal of the Graduate Education Cost and Manning Ad Hoc Committee was to establish common methodology for development of cost data to compare Air Force and Navy graduate programs (7:2-3). The ad hoc committee was able to develop comparable fiscal year 1975 costs for the NPS and AFIT. However, their efforts were not adequately documented to enable replication of their findings. Additionally, with the change of U.S. Government Presidential administrations and the subsequent termination of the Committee on Excellence in Education, follow-on cost reports were not requested. For these reasons the documentation fully explaining the techniques the ad hoc committee had employed, as well as any lessons learned, were not retained (19).

Haynes and Williamson Thesis

A thesis by Captains Haynes and Williamson provided a methodology for costing the fiscal year 1976 Graduate Logistics Management program but did not address the other AFIT programs. The primary intent of the thesis was to establish a cost comparison between AFIT and private universities offering similar advanced degree programs.

The comparison was accomplished and it was shown that the AFIT School of Systems and Logistics graduate degree costs compared favorably with similar programs offered by civilian institutions. While only a small segment of the total AFIT organization was the focus of this cost analysis, the Haynes and Williamson thesis provided a documented methodology which could be applied to a broader cost model (15:1).

Report of Graduate Education Cost and Training

In July 1978, renewed criticism of military service funded graduate education was expressed by the House of Representatives Committee on Appropriations. The House Committee was critical of the "considerable degree of inefficiency and lack of management control [that] pervades the [professional development and education] program [21:29]." The Committee noted that similar criticism was made in 1975 and that there was little evidence of any movement on the part of DOD to remedy the situation (21:29). As a consequence of their findings, the House Appropriations Committee recommended a 10 percent DOD-wide cut in funding for education and directed the DOD to provide a plan for the reassessment of ". . . the necessity for operating both the Naval Postgraduate School and the Air Force Institute of Technology [21:29]."

In response to the House of Representatives direction, the DOD, in turn, directed AFIT to accomplish a study

of its graduate programs. The final report, issued by the Air Training Command, attempted to make a direct cost comparison between the NPS and AFIT. It was acknowledged that such a comparison was not achieved due to various organizational differences, installation sizes, and definitional differences between the Services and between the schools. Additionally, the study did not attempt to arrive at a cost of individual AFIT education programs. Instead, costs were aggregated for all graduate level programs (4:1-5).

Summary of Studies

While previous studies have been accomplished, a review of these studies has shown a lack of documentation, particularly in the area of cost, which has made replication of the results impossible. This has led to a costly duplication of effort. Use of a well-defined cost model may help to preclude the need for yet another tailored study of AFIT costs (19).

It is clear that the current austere funding environment has reached DOD education programs. If this trend continues, further questions regarding AFIT program cost effectiveness and program reduction exercises can be expected. Recent experience has indicated that the costing questions and exercises directed by headquarters elements will no longer provide the four to five months response time allowed in the past. The proposed cost model will be

structured to provide data in a format responsive to such inquiries. It is for this reason that AFIT/ACB, the Budget and Accounting Division of the Resource Management Directorate, is supporting the development of an AFIT Cost Model (13).

Before addressing the development of the proposed AFIT cost model, a description of the mission, organization, and programs of AFIT is provided.

Mission, Organization, and Programs of AFIT

AFIT has evolved from the Army's Air School of Application, which was established in 1919 to provide special education in military aviation, to become the primary manager of Air Force advanced education programs. To assist in meeting the educational needs of the Air Force, AFIT supervises, administers, and conducts degree level as well as continuing education and specialized training programs. The degree level programs are designed to provide selected officers and Air Force civilians a broad educational background to develop and enhance technical expertise and managerial capabilities. The continuing education and training programs are intended to satisfy specific Air Force needs for special skills of an immediate nature (23:2-3).

The AFIT mission is:

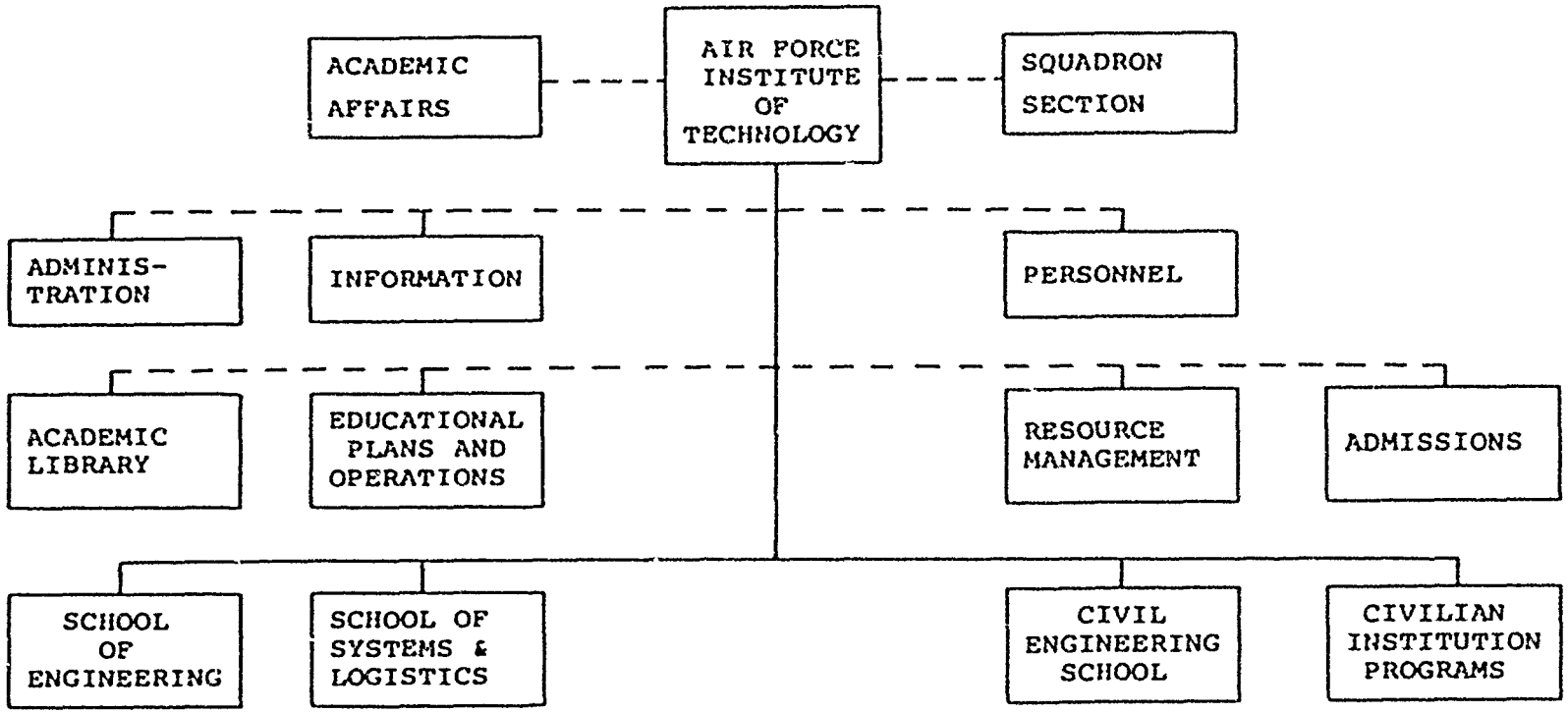
> . . . to plan, organize, conduct, and administer degree granting and continuing education programs in engineering, systems and logistics, civil engineering, management, medicine, and other fields at Wright-Patterson Air Force Base, Ohio, at other sites, and through contracts with civilian educational and health care institutions and industrial organizations in response to United States Air Force and Department of Defense requirements [5:1].

AFIT, which functions as a component of Air University under the Air Training Command, performs its mission through the educational and training programs of the School of Engineering, the School of Systems and Logistics, the Civil Engineering School, and the Civilian Institution Programs as reflected in the AFIT organization chart (Table 1) (6). The Institute has a dual role as a resident educational institution and as the monitor and supervisor of students in nonresident programs (23:148).

The School of Engineering offers programs leading to the Master of Science degree in various engineering fields, engineering physics, nuclear effects, electro-optics, computer systems, systems management, and operations research, and to the Doctor of Philosophy degree in engineering. These programs vary in length, generally ranging from fifteen to thirty-six months. The School of Engineering also conducts a limited continuing education program (CEP) consisting primarily of noncredit short courses offered in residence (23:4,20-24).

Table 1

AFIT Organization Chart



The School of Systems and Logistics offers graduate programs leading to the Master of Science degree in logistics management or facilities management. The logistics management program includes major areas of emphasis in procurement, international logistics or acquisition logistics management. The facilities management program provides specific program courses for civil engineering managers in contracting, economic analysis, and environmental and energy planning. Each of these programs is of fifty-three weeks duration. Additionally, the school conducts a program of short courses for continuing education and nondegree training in needed specialties. These CEP courses are conducted in residence or on-site throughout the United States and overseas (23:4,90-99).

The Civil Engineering School functions as a center for nondegree professional development of personnel in the civil engineering career field. The school provides resident nondegree training and continuing education programs. The resident program courses consist primarily of individual short courses designed to enhance specific job performance (23:4,138). Nonresident courses consisting of on-site seminars and telephone lectures are also offered.

Education and training of selected Air Force personnel at civilian colleges, universities, research centers, hospitals, and industrial organizations are administered by Civilian Institution Programs (CI) of AFIT. CI monitors

the programs and performance of approximately 4000 students at over 300 civilian institutions each fiscal year. The students are administratively assigned to AFIT with duty stations at the appropriate institution of study. The objective of this training is to meet specific Air Force requirements in science, engineering management, medicine, and the social sciences. The programs administered by CI include officer degree programs, the Airman Education and Commissioning Program, health care education programs, the Minuteman education program, the educational delay program, the education with industry program, the Operation Bootstrap permissive temporary duty program, and the Air Force special short course program (23:4,148-150).

AFIT organizations which support the educational programs and contribute to the overall cost of the education and training are also shown in the organization chart (Table 1) (6). In addition, various support elements of Wright-Patterson Air Force Base (AFB) provide needed services to AFIT and its students. The contributions made by each of these organizations should be considered in arriving at the total costs associated with educating students through AFIT resident programs.

Research Objectives

The overall objective of this research was to develop a standard model to be used for identifying, allocating, and forecasting costs associated with operating

the AFIT Schools of Engineering, Systems and Logistics, Civil Engineering, and the Civilian Institution Programs. Specific research objectives were to:

1. Identify the programs to be costed within AFIT.

2. Identify appropriate cost objectives within the AFIT schools and programs for assignment of costs.

3. Identify direct cost elements relating to specific AFIT schools and programs.

4. Identify indirect cost elements relating to specific AFIT schools and programs.

5. Determine an appropriate method for prorating indirect costs to specific AFIT cost objectives.

6. Identify "other" cost elements (pay and allowances) not included in direct and indirect cost elements relating to specific AFIT schools and programs.

7. Develop a cost model which incorporates the appropriate direct and indirect costs for purposes of reporting and forecasting.

8. Validate the proposed AFIT cost model with actual data.

Research Questions

The question for research was to determine an appropriate model for identifying, allocating, and forecasting the costs associated with operating the various AFIT schools and programs. Specific research questions were:

1. What are the various AFIT schools and programs to which costs will be assigned?

2. What are the appropriate cost objectives within the AFIT schools and programs for assignment of costs?

3. What are the direct cost elements relating to specific AFIT schools and programs?

4. What are the indirect cost elements relating to specific schools and programs?

5. What is an appropriate method for prorating indirect costs to specific AFIT cost objectives?

6. What are the other costs relating to specific AFIT schools and programs?

7. How should a cost model be structured in order to incorporate the appropriate direct and indirect costs for reporting and forecasting purposes?

8. Can the proposed AFIT cost model be validated?

CHAPTER II

RESEARCH METHOD

Introduction

The purpose of this chapter is to outline the procedures used in developing a standard cost model which was used for identifying, allocating, and forecasting costs associated with operating the various AFIT schools and programs. The chapter is divided into six major sections:

1. Research Approach
2. Responsibility Centers/Cost Centers
3. Cost Categories
4. Cost and Student Enrollment Data
5. Model Validation
6. Summary of Method, Assumptions, and Limitations

Research Approach

The overall approach to this research effort was to identify the full costs associated with the various AFIT schools and programs. Full cost was defined to be "the sum of direct cost plus an equitable share of indirect cost [9:25]." In some previous cost studies and training reports (3:42), the elements of cost were subdivided into direct, indirect, and other costs. This approach was used in this thesis in order to capture and identify all pertinent costs.

Because the Air Force uniquely provides student pay and allowances while classes are attended, a separate cost category (other) was identified. Due to this uniqueness and the magnitude of pay and allowances relative to total costs, it was deemed appropriate to separately identify "other" costs. Since these costs are not normally incurred by an educational institution, they were segregated to provide better visibility. Therefore, the full cost of AFIT programs is the sum of direct cost of education, a share of indirect cost, and pay and allowances.

The various AFIT programs were identified in the previous chapter. Those programs for which costs were accumulated are shown in Table 2.

TABLE 2

AFIT Programs for Which Costs Will Be Accumulated

Civil Engineering School Continuing Education Programs
Civilian Institution Education Programs
a. Undergraduate Degree Programs
b. Master's Degree Programs
c. Doctoral Degree Programs
d. Nonmedical Continuing Education Programs
e. Medical Degree Programs
f. Medical Continuing Education Programs
School of Engineering Graduate Education Programs
School of Engineering Continuing Education Programs

TABLE 2 (continued)

School of Systems and Logistics Graduate Education Programs
School of Systems and Logistics Continuing Education Programs

Responsibility Centers/Cost Centers

Fundamental to DOD accounting are responsibility centers (RC) which are those organization activities responsible for measurable inputs (resources) and outputs (production). Subordinate to responsibility centers are one or more cost centers (CC) which are those organizational activities where costs can be measured (8:3-1-302). Table 3 contains a list of the RC/CCs pertinent to AFIT programs.

Cost Categories

In order to determine the full cost of AFIT programs, the individual elements of cost were identified. A list of elements of cost was developed from the following sources: "Report of a Study on AFIT Resident Programs and Costs" (2); "Report of Graduate Education Cost and Manning Methodology" (7); "FY 1979/80 Operations Operating Budget, RCS: DD-COMP(AR)1092" (1); "RC Manager Monthly Report" (36); and "Formal Training Course Cost Report, RCS: HAF-ACM(AR) 7108" (31). Each of these was an effort to report the cost of AFIT education programs to the Air Force. During the course of these exercises, a list of the elements of cost pertinent to AFIT operations was developed.

TABLE 3

AFIT Responsibility/Cost Centers
(as of Jan 1978)

Organization	RC/CC
Commander	K0
Office of Information	K01040
Comptroller	K01500
Data Automation	K01540
Consolidated Base Personnel Office	K01620
Headquarters	K03600
Communications	K02600
Director of Administration	K03610
Academic Support	K03620
Supply	K01200
Graphics	K03274
Minor Construction	K04420
Civilian PCS (Headquarters)	K08101
Academic Library	K04561
Civilian Institutions/Staff	K13600
Continuing Education (Short Course)	K13601
Minuteman Education Program	K13602
Graduate Education (Long Course)	K13603
Airman Education and Commissioning Program	K13604
Staff Judge Advocate	K13605
Weather Officer Course	K13606
Civilian PCS	K18101
Medical Administration	K13650
Medical Continuing Education	K15501
Medical Graduate Educ (Long Crs), AFR 53-11	K15503
Medical Graduate Education, AFR 53-11	K15290
Medical Grad Educ (Long Crs), AFRs 36-13 & 36-46	K16613
Medical HPSP-Physicians	K55500
Medical HPSP-Dentists	K65500
Medical HPSP-Veterinarians	K75500
Medical HPSP-Other	K85500

TABLE 3 (continued)

Organization	RC/CC
School of Engineering/Staff	K2360X
Dept of Aero/Mechanical/Engineering Systems	K2361X
Dept of Mathematics	K2362X
Aerospace Design Center	K2363X
Dept of Electrical Engineering	K2364X
Dept of Humanities	K2365X
Dept of Physics	K2367X
Dept of Systems Management	K2368X
Civilian PCS	K28101
School of Systems and Logistics/Staff	K3360X
Graduate Education (Long Course)	K3361X
Continuing Education (Short Course)	K3362X
Academic Development and Support	K3363X
Civilian PCS	K38101
Civil Engineering School/Staff	K43600
Continuing Education (Short Course)	K43601
Nonresident Program	K43602
Civilian PCS	K48101

Each element of cost was reviewed to determine its relationship to the full program cost. Program costs were subdivided into direct costs plus an equitable share of indirect costs. Direct costs are defined as "those elements of cost that are directly traceable to a single cost objective (purpose for which costs are measured) [9:25]." Indirect costs are those that are applicable to more than one program, such as heating costs of a jointly used facility. Allocation of these costs was accomplished by determining an individual program's prorata share of the total indirect costs. More specifically, the following method was used to allocate indirect costs; the number of AFIT students, faculty and staff were computed as a percentage of the total base population. The total indirect costs attributable to AFIT were then assigned to each of the programs based on the program's ratio of student weeks to total AFIT student weeks. A student week is defined to be one student attending a course for seven consecutive calendar days (7). Student week was utilized because it is the only unit that can be used as a measure for costing all of the various programs being examined. This is not true of other measures such as quarter hours or cost per graduate which do not provide a common denominator for comparing both graduate degree programs and continuing education. As previously mentioned, the full cost of the programs that were examined includes another cost category in addition to direct and

indirect cost elements. These other costs, defined as pay and allowances, were allocated to the various programs based upon the modal rank/grade and the actual number of students enrolled.

Cost and Student Enrollment Data

The monetary data required to develop and test the proposed model was collected from the fiscal year 1977 and 1978 records of the AFIT Comptroller and the Accounting and Finance Office of the 2750th Air Base Wing, Wright-Patterson AFB, Ohio. These records included the "Responsibility Center (RC) Manager Monthly Report" (36), and the "RC Manager Cost Center Report" (35). Monetary factors for military pay and permanent change of station moves were based upon actual fiscal year 1977 and 1978 averages and statutory rates presented in the "Air Force Justification of Estimates" (33) for the appropriate fiscal years.

Student enrollment figures for fiscal years 1977 and 1978 were obtained from the applicable reports maintained by the AFIT Directorate of Education Plans and Operations.

Model Validation

A solution for a predictive model is only as good as the data upon which it is based. Since it was necessary to make subjective judgements when developing the proposed model, the model was tested to determine its validity before

it could be recommended. One way to validate a model of this type is to input different sets of data, and check if the solution resembles the historical behavior of the system. Obviously, if the model is unable to successfully describe historical occurrences, it should not be considered valid for making future predictions; therefore, further adjustments to the model would be in order (20:32-33).

The specific method that was used to test the forecasting feature of the proposed AFIT cost model was to input actual fiscal year 1977 cost data into the model. The resultant output was then compared with fiscal year 1978 actual full cost data and any differences were analyzed.

Summary of Method, Assumptions, and Limitations

In summary, the proposed AFIT cost model was used to gather and format cost data regarding specific AFIT schools and programs for both historical cost reporting and forecasting purposes. The method of developing the model, in brief, was to:

1. Collect data available from existing Air Force reports.

2. Categorize the data as direct, indirect, or other.

3. Identify the categorized data to the appropriate RC/CC.

4. Assign (or allocate where necessary) the aggregated RC/CC data to the appropriate AFIT program.

This thesis presents a methodology for cost identification, accumulation, and forecasting of AFIT programs. The monetary cost elements and, therefore, the full cost in this thesis was for a single fiscal year.

Summary List of Assumptions

The assumptions made in this thesis were:

1. The elements of cost for each program can be identified.

2. A monetary value can be placed upon each element of cost which is identified.

3. It is possible to prorate indirect costs in an equitable manner.

4. It is possible to develop a model using only existing Air Force data sources.

Summary List of Limitations

The limitations of the proposed cost model are:

1. The data used to develop proration factors were historical and variations in the environment may require adjustments to the factors.

2. The methodology that was developed may only be applied to the prescribed AFIT programs.

CHAPTER III

COST CATEGORIES

Overview

Within this chapter, each cost category used to determine the full cost of the various AFIT schools and programs is identified and defined. Using the methodology presented in Chapter II, a cost matrix was developed for each of the cost objectives appearing in Table 4. The matrix was organized to highlight the three general cost categories previously defined (see Table 5): direct, indirect, and other (student pay and allowances). Using each category as a major subunit of the cost model, further divisions were developed consistent with existing Responsibility Center (RC) Manager Monthly Reports. In the case of the indirect cost of education, three subheadings were identified under which specific costs were collected. The major headings under indirect costs were identified as AFIT Indirect Costs, Base Support Costs, and Command Overhead. Specific definitions of these indirect cost elements are presented in this chapter.

Pertinent to all cost categories are the unfunded retirement benefits of both military and civilian employees. A section entitled Unfunded Retirement explains how this

TABLE 4

Cost Objectives

- Civil Engineering School
  - Continuing Education Resident Programs
  - Continuing Education Nonresident Programs
- Civilian Institution Programs
  - Nonmedical
    - Undergraduate Degree Programs (AECP)
    - Master's Degree Programs
    - Doctoral Degree Programs
    - Continuing Education Programs
  - Medical
    - Medical Degree Programs
    - Continuing Education Programs
- School of Engineering
  - Master of Science Degree Programs
  - Doctor of Philosophy Degree Programs
  - Continuing Education Programs
- School of Systems and Logistics
  - Master of Science Degree Programs
  - Continuing Education Resident Programs
  - Continuing Education Nonresident Programs

TABLE 5

Categorical Breakdown of AFIT
Cost Matrix

Direct Cost
Indirect Cost
AFIT Indirect
Base Support
Command Overhead
Other (Student Pay and Allowances)

cost was identified and treated within the various cost categories. In the concluding section of this chapter, the methods used to allocate the various indirect cost elements to cost objectives are justified and explained.

Direct Cost of Education

This section identifies direct costs, which are "those elements of cost that are directly traceable to a single cost objective [9:25]." The elements are summarized in Table 6.

Faculty and Staff

This element of cost includes pay and allowances of the faculty/staff directly associated with a given cost objective.

TABLE 6

Elemental Breakdown of AFIT Direct
Cost Category

Direct Costs
Faculty/Staff
Faculty and Staff PCS
Faculty and Staff TDY
Traveling Instructors
Student Temporary Duty (TDY) and Per Diem
Student Research and Field Trips TDY and Per Diem
Civilian Graduate Education TDY
Data Automation and Services
Rent and Other Equipment
Contract Education
Purchased Maintenance and Equipment - Other
Printing and Reproduction
Miscellaneous Contract Services
Supplies and Material
Student PCS
Subtotal
Unfunded Retirement and Disability
Total AFIT Direct Costs

Faculty and Staff Permanent Change of Station (PCS)

This element of cost is incurred when new faculty/staff are assigned to AFIT. The PCS costs were computed based on a four year tour of duty for the faculty/staff identified to a particular school/program. Accordingly, it was assumed that one-fourth of the faculty/staff would be replaced each fiscal year. Computational methods are contained in Table 7.

Faculty and Staff Temporary Duty (TDY) Travel and Per Diem

This element of cost is incurred when faculty/staff perform travel in connection with their AFIT functions. Examples of such travel are seminars and travel to support research. The cost is comprised of travel and per diem allowances.

Traveling Instructors TDY Travel and Per Diem

This element of expense is incurred in support of nonresident continuing education programs. Instructors must be transported from AFIT to the sites where the AFIT courses are being conducted. Included in the cost are travel and per diem allowances.

TABLE 7

Computation of PCS Costs for AFIT Overhead Personnel, Faculty, and Staff

	FY 77		FY 78	
	Officer	Airman	Officer	Airman
1. Cost of PCS move - operational personnel (14):	$ 2,633	$ 1,169	$ 3,003	$ 1,418
2. Military personnel assigned by school/program and overhead categories (30):				
a. Civil Engineering School	28	3	28	3
b. Civilian Institution Programs	14	6	14	6
c. School of Engineering	51	3	51	3
d. School of Systems and Logistics	56	4	56	4
e. AFIT overhead	26	74	26	74
3. Total number of PCS moves per year (assumes four year tour of duty):				
a. Civil Engineering School	7.00	.75	7.00	.75
b. Civilian Institution Programs	3.50	1.50	3.50	1.50
c. School of Engineering	12.75	.75	12.75	.75
d. School of Systems and Logistics	14.00	1.00	14.00	1.00
e. AFIT overhead	6.50	18.50	6.50	18.50
4. Total cost of PCS moves by school/program and overhead categories (number of moves multiplied by applicable cost):				
a. Civil Engineering School	$18,431	$ 877	$21,021	$ 1,064
b. Civilian Institution Programs	9,216	1,754	10,511	2,127
c. School of Engineering	33,571	877	38,288	1,064
d. School of Systems and Logistics	36,862	1,169	42,042	1,418
e. AFIT overhead	17,115	21,627	19,520	26,233

Student TDY Travel and Per Diem

This element of cost is incurred when students are transported to and from AFIT to attend continuing education courses. Per diem allowances for the period of schooling are also included (15:69).

Student Research and Field Trips TDY Travel and Per Diem

This element of cost is incurred when a resident graduate student is officially ordered to travel from AFIT to accomplish thesis research, to brief thesis results, or to participate in course-related field trips (2:27-49).

Civilian Graduate Education TDY

This element of cost is incurred when civilian AFIT resident graduate students elect to attend AFIT under TDY status as opposed to a PCS move (2:27-49).

Data Automation and Services

This element of cost is incurred for academic and administrative computer support directly identifiable to a specific AFIT resident school (23:4).

Rent and Other Equipment

This element of cost is incurred when equipment related to a given cost objective is rented. Rental of word processing equipment falls into this category (2:51-52).

Printing and Reproduction

This element of cost is incurred by AFIT for printing and reproduction services provided to the faculty and staff of AFIT. These services include reprinting current articles and documents for classroom instructional use utilizing AFIT-operated reproduction equipment (2:53).

Contract Education

This element of cost is incurred for tuition and fees (such as laboratory fees) charged for enrollment in civilian institutions (2:54-57).

Purchased Maintenance and Equipment - Other

This element of cost is incurred by AFIT when services are contracted for the repair of equipment, such as office equipment or laboratory equipment (2:59).

Miscellaneous Contract Services

This element of cost is incurred for such services as registration fees for symposiums and textbook/thesis reimbursement (2:60-70).

Supplies and Materiel

This element of cost includes supplies and equipment (both stock fund and nonstock fund) used in or in support of classes (2:71-75).

Student PCS

This element of cost includes the movement of long-course students from their last duty station to AFIT or to a civilian institution. Computational details appear in Table 8 (14).

Indirect Cost of Education - AFIT Indirect Costs

The indirect cost subcategory, AFIT Indirect Costs, is comprised of all AFIT cost centers that cannot be identified to a specific cost objective. The subtotal of all direct costs, described in the preceding section, added to the AFIT indirect costs, defined in this section, provides a convenient summary of costs for which AFIT has direct budgetary control. The following is a brief description of each of the cost elements included under the AFIT Indirect Cost category (Table 9).

Commander

This element of cost includes military pay, both officer and enlisted, for individuals in transit between AFIT and their next or previous duty station. See Table 14 for computational details (36:248).

Information Management

This element of cost is incurred by AFIT as a result of internal and public information management and development (23:5).

TABLE 8

Computation of Student PCS Costs by AFIT School/Program

	FY 77		FY 78	
	Officer	Airman	Officer	Airman
1. Cost of PCS move (training) (14):	$ 1,865	$ 389	$ 2,276	$ 445
2. Student man years by AFIT school/program requiring PCS move:				
a. Civil Engineering School	0		0	
b. Civilian Institution Programs				
(1) Masters Degree Programs	439.93		340.00	
(2) Doctoral Programs	131.93		151.00	
(3) Airman Education and Commissioning Program (AECP)	18.69		230.00	
(4) Medical Degree Programs	2,144.00		2,006.00	
c. School of Engineering				
(1) Masters Degree Programs	315.75		316.60	
(2) Doctoral Programs	24.88		31.22	
d. School of Systems and Logistics - Masters Degree Programs	154.25		143.61	
3. Number of PCS moves (man years divided by length of school/ program):				
a. Civil Engineering School	0		0	
b. Civilian Institution Programs:				
(1) Masters Degree - 1.5 years	293.29		226.67	
(2) Doctoral Programs - 3 years	43.98		50.33	
(3) AECP - 2 years	9.35		115.00	
(4) Medical Degree Programs - 4 years	536.00		501.50	
c. School of Engineering				
(1) Masters Degree Programs - 1.5 years	210.50		211.07	
(2) Doctoral Programs - 2 years	12.44		15.61	
d. School of Systems and Logistics - Masters Degree Programs - 1 year	154.25		143.61	
4. Student PCS costs by school/program:				
a. Civil Engineering School	0		0	
b. Civilian Institution Programs:				
(1) Masters Degree	$546,980		$515,893	
(2) Doctoral Programs	82,016		114,559	

TABLE 8 (continued)

	FY 77		FY 78	
	Officer	Airman	Officer	Airman
(3) AECP		3,635		51,175
(4) Medical Degree Programs		999,640		1,141,414
c. School of Engineering				
(1) Masters Degree Programs		392,583		480,388
(2) Doctoral Programs		23,201		35,528
d. School of Systems and Logistics - Masters Degree Programs		287,676		326,856

TABLE 9

Elemental Breakdown of AFIT Indirect Cost Category

Indirect Costs
AFIT Indirect Costs
Commander
Information Management
Supply
Comptroller
Data Automation
Consolidated Base Personnel Office (CBPO)
Communications
Graphics
Headquarters Staff
AFIT Overhead - PCS
Directorate of Administration
Academic Support
Minor Construction
Academic Library
Subtotal
Unfunded Retirement
Total AFIT Indirect Costs

Supply

This element of cost is incurred by AFIT as a result of a central supply administrative function required to obtain supplies for AFIT's various schools and programs (2:71-75).

Comptroller

This element of cost is incurred by AFIT as a result of budget, data analysis, accounting, financial and resources control, and conservation support within AFIT (23:5).

Data Automation

This element of cost is incurred by AFIT as a result of data automation services performed by a centralized activity in support of AFIT educational programs (23:4).

Consolidated Base Personnel Office (CBPO)

This element of cost is incurred by AFIT in support of military AFIT students, staff, and faculty. The services provided include, but are not limited to, records maintenance, career assistance; assignments; manning control; on-the-job training programs; pay, allowances, and leave assistance; and personnel testing, counselling, and other services (23:5).

Communications

This element of cost is incurred by AFIT to administer lease lines, toll calls, and common user communication

services. Not included in this category are the actual charges for the communication services which are included in the base support portion of indirect costs (36:256).

Graphics

This element of cost is incurred by AFIT for art/graphic support provided to both the faculty and students of AFIT. This includes, but is not limited to, transparencies for classroom use, materials in support of classroom training, and personnel salaries (23:4).

Headquarters Staff

This element of cost is incurred as a result of command overhead functions performed by the AFIT headquarters staff. These costs are primarily, but not limited to, pay and allowances for personnel within the offices of the Commander, Education Plans and Operation, and Admissions Directorate (36:258-259).

AFIT Overhead - PCS

This element of cost is incurred as a result of PCS costs relating to AFIT military personnel not identifiable to a specific school/program. The costs were computed based on a four year tour of duty. Computational specifics are contained in Table 7.

Director of Administration

This element of cost is incurred for administrative support provided all of AFIT. This includes, but is not limited to, publications and forms management, document preparation and distribution, editing, and advisory services (23:4-5).

Academic Support

This element of cost includes the services and support required for both the students and faculty of AFIT. Academic support includes, but is not limited to, secretarial services, partial reimbursement to graduate students for textbooks and thesis typing costs, guest speakers, supplies and audiovisual support (15:78).

Minor Construction

This element of cost is incurred as a result of minor remodeling and repair of facilities occupied by AFIT where the total cost of any single project is less than $50,000 (36:109-110).

Academic Library

This element of cost relates to the academic library which supports the educational programs of the Institute with technical library facilities and services. These costs include, but are not limited to, salaries of civilian

library personnel, the cost of procuring books, subscriptions for magazines, newspapers and periodicals and services (23:4).

Indirect Cost of Education - Base Support Costs

The elements of cost covered under this subcategory include those base services extended to AFIT, which is a tenant organization at Wright-Patterson AFB (see Table 10). The basis of the cost allocations is explained in a subsequent section of this chapter entitled "Indirect Cost Allocations."

Base Commander/Staff

This element of cost includes a portion of the operating costs of the Base Commander and associated staff functions (36:38).

Staff Judge Advocate

This element of cost includes a portion of the operating costs of the Staff Judge Advocate. These costs include, but are not limited to, legal services rendered AFIT faculty, staff, and students. Such services provided to AFIT include the functions and responsibilities as Staff Judge Advocate and duties as Base Claims Officer (32:13).

Chaplain

This element of cost includes a portion of the operating costs associated with services provided to AFIT

TABLE 10

Elemental Breakdown of AFIT Indirect Base Support Costs Category

Indirect Costs

Base Support Costs

Base Commander/Staff
Staff Judge Advocate
Chaplain
Base Comptroller
Transportation
Security Police
Safety
Supply Administration
Services
Base Plans
Disaster Preparedness
Civil Engineering
Building Depreciation
Communications Administration
Reproduction
Medical Service

Subtotal

Unfunded Retirement

Total Indirect Base Support Costs

faculty, staff, and students by the Base Chaplain. These services include, but are not limited to, pastoral ministry, to include opportunities for worship, religious rites, pastoral visits, spiritual counseling, and religious education (32:13).

Base Comptroller

This element of cost includes a portion of the operating costs in recognition of the services provided AFIT by the Base Comptroller. This includes, but is not limited to, military pay and allowances, payment of travel vouchers, tuition payments, and budget services including preparation of budget estimates and financial plans (32:15).

Transportation

This element includes a portion of the operating costs of Base Transportation. Services provided to AFIT include those extended by the following Base Transportation cost centers: Transportation Branch, Vehicle Operations Section, Traffic Management, and Vehicle Maintenance Sections (32:2; 36; 37).

Security Police

This element of cost includes a portion of the operating costs of the Base Security Police. The services provided include, but are not limited to, law enforcement actions and special investigations (15:87).

Safety

This element of cost includes a portion of the operating costs of the Base Safety Office. These costs are associated with, but not restricted to, the following services: review of unit safety programs, inspections, technical guidance, and motor vehicle accident prevention and investigation (15:87-88).

Supply Administration

This element of cost includes a portion of the operating costs of Base Supply Administration. This cost is being allocated as a result of the services provided by Base Supply Administration in support of AFIT supply requirements. The following Supply Administration cost centers were included: Office of Chief of Supply, Material Storage and Distribution, Management Procedures, Material Management Section, Customer Support Section, and Supply Systems Section (36:317; 37:317-324).

Services

This element of cost includes a portion of the operating costs associated with the following services: commissary, laundry and dry cleaning, bachelor and transient billeting service, and billeting management (32:5).

Base Plans

This element of cost includes a portion of the operating costs associated with services provided by Base

Plans. These services include, but are not limited to, the development and monitorship of base level operations and contingency plans not specifically assigned to functional areas, and the negotiation and maintenance of host-tenant agreements (32:6).

Disaster Preparedness

This element of cost includes a portion of the operating costs of the Disaster Preparedness Office. Included in the services provided to AFIT is training, as specified in Air Force directives, and emergency wartime operation and DOD shelter programs (32:6).

Civil Engineering

This element of cost includes a portion of the Base Civil Engineering operating budget. The services provided by Civil Engineering to AFIT include, but are not limited to, utilities, custodial services for buildings assigned to AFIT, maintenance of real property records, and the processing of work requests.

Building Depreciation

This element of cost is an allocation of building investment costs. The method of calculating depreciation used is documented in a subsequent section of this chapter entitled "Indirect Cost Allocation."

Communications Administration

This element of cost includes a portion of the operating costs incurred by the base for ground communication electronics maintenance. The services provided include, but are not restricted to, organizational maintenance for AFIT operated equipment (32:2-3).

Reproduction

This element of cost includes a portion of the operating costs incurred by the Base Printing and Duplicating Office. The services provided AFIT include, but are not limited to, duplication and copying services (including administration) provided on a nonreimbursable basis (36:50).

Medical Services

This element of cost is an allocation of a portion of the operating expenses of the medical facilities at Wright-Patterson AFB. These facilities provide inpatient and outpatient medical and dental care to all active duty and retired military personnel in the vicinity of Wright-Patterson AFB, including AFIT resident and TDY military personnel (15:98).

Indirect Cost of Education - Command Overhead

The elements of cost covered under this subcategory include the resources, in terms of cost, expended by Air University, Air Training Command, and Headquarters USAF in

support of AFIT. The basis of the cost allocation is explained in a subsequent section of this chapter entitled "Indirect Cost Allocations." A list of the cost elements is provided below in Table 11.

TABLE 11

Elemental Breakdown of AFIT Indirect Command Overhead Costs Category

Command Overhead
Air University
Air Training Command
Headquarters USAF
Total Command Overhead Costs

Due to the material impact on overhead costs, it is important to note that prior to fiscal year 1978 AFIT was directly subordinate to Air University, then a major command. In fiscal year 1978, as a result of a reorganization, Air Training Command became the major command, and Air University then became an intermediate headquarters to which AFIT was subordinate.

The allocation of all three subcategories of command overhead to the AFIT schools/program was accomplished as shown in Table 1 , Item 4. The total of each school's/ program's faculty, staff, and resident and nonresident students expressed in man weeks was divided by the AFIT total. The resultant percentage was then applied to the

TABLE 12

Command Overhead Costs

1. Headquarters USAF (HQ USAF) overhead costs applied to AFIT schools/program (10)		
a. Personnel salaries:		
(1) 12.5 percent of one Colonel		4,578
(2) 50 percent of one Lieutenant Colonel		14,748
(3) 100 percent of one Lieutenant Colonel		29,496
(4) 33.3 percent of one GS-5 Secretary		3,851
b. Total FY 77 and FY 78 HQ USAF overhead assigned to AFIT		52,673
2. Headquarters Air Training Command (ATC) overhead costs applied to AFIT schools/program (12)		
Total FY 78 HQ ATC overhead assigned to AFIT		4,664,238
3. Headquarters Air University (AU) costs applied to AFIT schools/program (11)		
	FY 77	FY 78
a. Total HQ AU overhead costs	3,094,000	3,803,000
b. Percent allocated to AFIT in FY 77 and 78	.092	
c. HQ AU overhead costs assigned to AFIT	284,648	349,876
4. Allocation percentage to specific school/program:		
a. Civil Engineering (CE) School:		
(1) Total faculty and staff, and resident and nonresident students in man weeks	6907.68	6845.28
(2) Total AFIT faculty and staff, and resident and nonresident students in man weeks	217936.68	219033.36
(3) CE School percentage of total AFIT faculty and student body	3.17	3.13

TABLE 12 (continued)

b. Civilian Institution (CI) Programs		
(1) Total faculty and staff, and resident and nonresident students in man weeks	150861.88	150677.8
(2) Total AFIT faculty and staff, and resident and nonresident students in man weeks	217936.68	219033.36
(3) CI Program's percentage of total AFIT faculty and student body	69.22	68.79
c. School of Engineering		
(1) Total faculty and staff, and resident and nonresident students in man weeks	29409.64	29445
(2) Total AFIT faculty and staff, and resident and nonresident students in man weeks	217936.68	219033.36
(3) School of Engineering's percentage of total AFIT faculty and student body	13.58	13.44
d. School of Systems and Logistics		
(1) Total faculty and staff, and resident and nonresident students in man weeks	30578.08	31961.28
(2) Total AFIT faculty and staff, and resident and nonresident students in man weeks	217936.68	219033.36
(3) School of Systems and Logistics percentage of total AFIT faculty and student body	14.03	14.64

AFIT command overhead totals in order to determine each school's/program's share.

Air University (AU)

This element of cost includes a portion of the operating costs of Air University. These costs include, but are not limited to, personnel pay and allowances, equipment, and supplies used in support of AFIT schools and programs. Computational details are contained in Table 12, Item 3 (11).

Air Training Command (ATC)

This element of cost includes a portion of the operating costs of ATC. These costs include, but are not limited to personnel pay and allowances, equipment, and supplies used in support of AFIT schools and programs (12). Computational details are contained in Table 12, Item 2 (12).

Headquarters Air Force (HQ USAF)

This element includes a portion of the operating cost of HQ USAF. Specifically, the costs are limited to personnel from the Professional Education Programs Office which support the AFIT programs. Computational details are contained in Table 12, Item 1 (10).

Other Costs

The final cost category addressed includes student pay and allowances (Table 13). In all cases, with the exception of the Airman's Education and Commission Program

(AECP), the modal student was determined to be a married captain with over eight years of service. In the case of AECP, the modal student was identified as a married staff sergeant with more t..an eight years of service. Student pay and allowances has been defined as the pay and allowances earned by AFIT students during the time period they are enrolled at AFIT.

TABLE 13

Elemental Breakdown of Other Costs Category

Other (Student Pay & Allowances)
Subtotal
Unfunded Retirement
Total
Total Student Weeks
Cost per Student Week

Unfunded Retirement

Although retirement benefits are not paid immediately, the costs are incurred at the time that the employees perform their duties, and are properly an expense of current operations (9:124). For this reason, the cost element of Unfunded Retirement was added to direct, indirect and other cost categories. This category is presented as a separate element so that it may be either included or

excluded depending upon the purpose for which the model is being used.

One exception to the rule of applying unfunded retirement to all cost categories was command overhead. Due to the formatting of the cost data provided by AU, ATC, and HQ USAF, it was not feasible to apply the military or civilian unfunded retirement factors.

Unfunded Military Retirement

This element of cost is derived by multiplying military pay and allowances by 17 percent (7:4).

Unfunded Civilian Retirement and Disability Benefits

This element of cost is derived by multiplying civilian pay by 20.4 percent (40:24).

Indirect Cost Allocation

Allocation Criteria

Indirect costs, by definition, are costs applicable to several cost objectives. An equitable share of indirect costs has been allocated to each cost objective, as appropriate, according to either of two criteria: (1) in proportion to the benefits received by the cost objectives; or (2) in proportion to the extent that each cost objective caused the cost to be incurred (6:122). In the following

paragraphs, the specific methods used to allocate the various elements of indirect cost will be explained. The first such allocation to be addressed involves the category AFIT Indirect Cost (9:122).

AFIT Indirect Costs

Table 14 is an explanation of how the allocation ratios by school/program were computed. These ratios were used to determine a school's or the Civilian Institution Program's share of AFIT Indirect Costs. Further allocation of these indirect costs within a particular school or the Civilian Institution Program was accomplished by developing ratios by cost objective (e.g., resident and continuing education) based upon the cost objective's share of the total student weeks output of that school/program. These computations are detailed in subsequent chapters.

The rationale for using these particular ratios to allocate AFIT Indirect Costs is in accordance with the criteria cited earlier, (e.g., in proportion to the benefits received by the cost objectives) and within the constraint of using existing data sources to the maximum extent feasible.

The one exception to the above AFIT Indirect Cost Allocation rule was the AFIT indirect cost element captioned "Commander." This element of cost was allocated using a ratio of a school's share of faculty, staff, and PCS

TABLE 14

Indirect Cost Allocation Factors

	FY 77	FY 78
1. AFIT personnel as a percentage of total Wright-Patterson AFB (WPAFB) population for fiscal years (FY) 1977 and 1978:		
a. WPAFB civilian and military population (29; 30)	23,861	24,266
b. AFIT civilian and military population (staff, faculty, and students) (38; 26; 24; 27; 25)	1,301	1,306
c. Percentage	5.45	5.38
2. Allocation of AFIT overhead personnel:		
a. Faculty and staff assigned to specific school/program (38):		
(1) Civil Engineering School	43	42
(2) Civilian Institution Programs	41	38
(3) School of Engineering	137	135
(4) School of Systems and Logistics	129	129
Totals	350	344
b. Percentage of faculty and staff assigned to specific school/program by school/program:		
(1) Civil Engineering School (i.e., 43 ÷ 350 for FY 77)	12.29	12.21
(2) Civilian Institution Programs	11.71	11.05
(3) School of Engineering	39.14	39.24
(4) School of Systems and Logistics	36.86	37.50
Totals	100.00	100.00
c. Number of AFIT overhead personnel (38):	182	174
d. Number of AFIT overhead personnel allocated to specific school/ program:		
(1) Civil Engineering School	22.37	21.24
(2) Civilian Institution Programs	21.31	19.23
(3) School of Engineering	71.23	68.28
(4) School of Systems and Logistics	67.09	65.25
Totals	182.00	174.00

TABLE 14 (continued)

	FY 77	FY 78
3. Specific AFIT school/program personnel as a percentage of total AFIT personnel:		
a. Civil Engineering (CE) School:		
(1) Faculty and staff assigned	43.00	42.00
(2) AFIT overhead personnel allocation	22.37	21.24
(3) Resident program output in student man years (24; 25)	55.48	57.82
(4) Total CE School faculty, staff, and resident students	120.85	121.06
(5) Total CE School as a percentage of total AFIT population (i.e., 120.85 ÷ 1301 for FY 77)	9.29	9.27
b. Civilian Institution Programs (CIP):		
(1) Faculty and staff assigned	41.00	38.00
(2) AFIT overhead personnel allocation	21.31	19.23
(3) Resident program output in student man years	0	0
(4) Total CIP faculty, staff, and resident students	62.31	57.23
(5) Total CIP as a percentage of total AFIT population	4.79	4.38
c. School of Engineering:		
(1) Faculty and staff assigned	137.00	135.00
(2) AFIT overhead personnel allocation	71.23	68.28
(3) Resident program output in student man years (24; 25; 26; 27)	357.34	362.23
(4) Total School of Engineering faculty, staff, and resident students	565.57	565.51
(5) Total School of Engineering as a percentage of total AFIT population	43.46	43.31
d. School of Systems and Logistics:		
(1) Faculty and staff assigned	129.00	129.00
(2) AFIT overhead personnel allocation	67.09	65.25
(3) Resident program output in student man years (24; 25; 26; 27)	356.45	367.63

TABLE 14 (continued)

	FY 77	FY 78
(4) Total School of Systems and Logistics faculty, staff and resident students	552.54	561.88
(5) Total School of Systems and Logistics as a percentage of total AFIT population	42.46	43.04

students (including Civilian Institution Program students) to the AFIT total (Table 15). The total TDY students were excluded from the ratio computation because the cost associated with the AFIT indirect cost element "Commander" is primarily pay and allowances of personnel between permanent duty stations. These costs were allocated within schools (between programs) in the same manner as all other AFIT indirect costs.

Base Support Indirect Costs

The next subcategory of indirect cost to be considered is Base Support. All elements of base support costs, except civil engineering and depreciation of buildings, were allocated using the ratio of AFIT faculty, staff, and resident students to the total base population (Table 14, Item 1). Once the AFIT portion of base support costs was identified, these costs were then allocated to the various schools and programs based on the specific school's/program's respective proportion of the total AFIT faculty, staff, and resident students as depicted in Tables 16 and 17. Further allocation of these indirect costs within a particular school or the Civilian Institution Program was accomplished by developing ratios, by cost objective, based upon the cost objective's share of the total student weeks output of that school/program. These computations are detailed in subsequent chapters. As already mentioned, base civil engineering

TABLE 15

Allocation of AFIT Indirect Cost - Commander

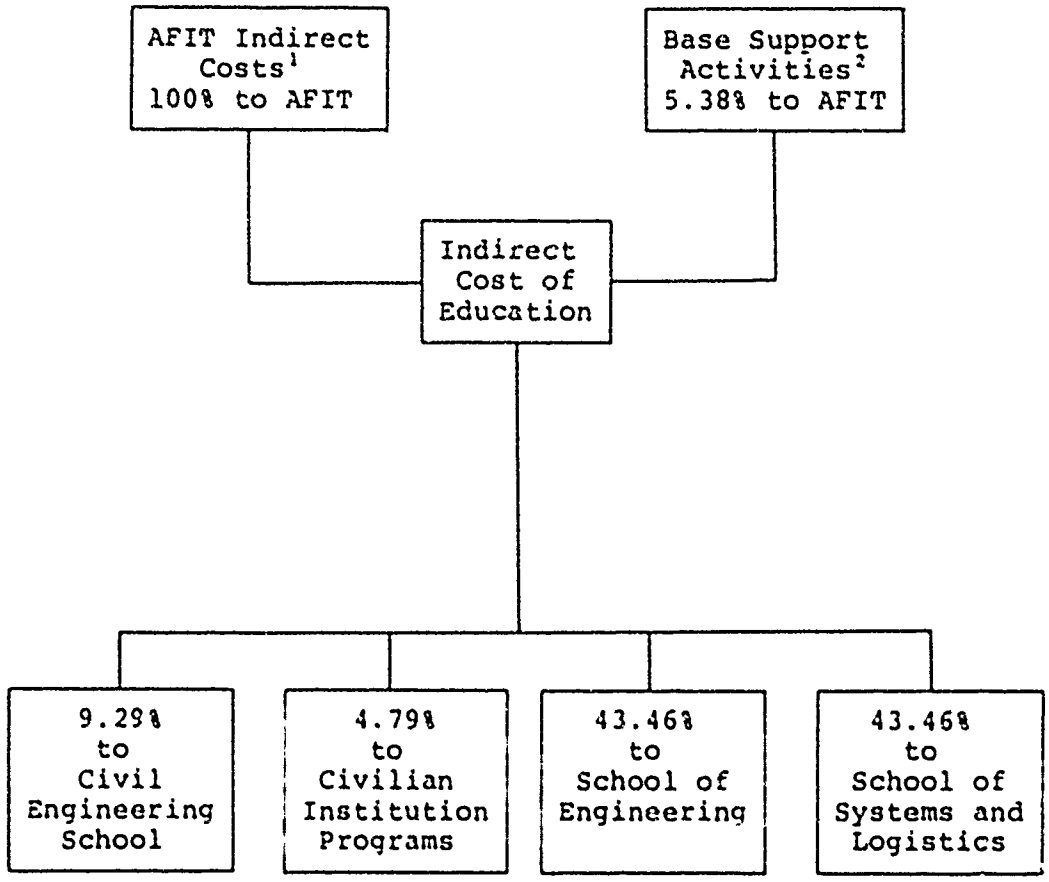
	FY 77	FY 78
1. Total AFIT faculty and staff (military) (38):	170	165
2. Total AFIT PCS students (26; 27):	3,320	3,263
3. Total AFIT faculty, staff, and PCS students:	3,400	3,428
4. Allocation percentage to specific school/program:		
a. Civil Engineering (CE) School:		
(1) Military faculty and staff:	32	31
(2) PCS students:	0	0
(3) Total military faculty and staff and PCS students:	32	31
(4) Total CE School as a percentage of total AFIT faculty, staff, and PCS students:	.9	.9
b. Civilian Institution Programs (CIP):		
(1) Military faculty and staff:	23	20
(2) PCS students:	2,735	2,727
(3) Total military faculty and staff and PCS students:	2,758	2,747
(4) Total CIP as a percentage of total AFIT faculty, staff, and PCS students:	81.2	80.1
c. School of Engineering:		
(1) Military faculty and staff:	55	54
(2) PCS students:	341	392
(3) Total military faculty and staff and PCS students:	396	446
(4) Total School of Engineering as a percentage of total AFIT faculty, staff, and PCS students:	11.6	13.0
d. School of Systems and Logistics:		
(1) Military faculty and staff:	60	60
(2) PCS students:	154	144
(3) Total military faculty and staff and PCS students:	214	204

TABLE 15 (continued)

	FY 77	FY 78
(4) Total School of Systems and Logistics as a percentage of total AFIT faculty, staff, and PCS students:	6.3	6.0

TABLE 16

Method of Allocating Indirect Cost of Education - FY 77

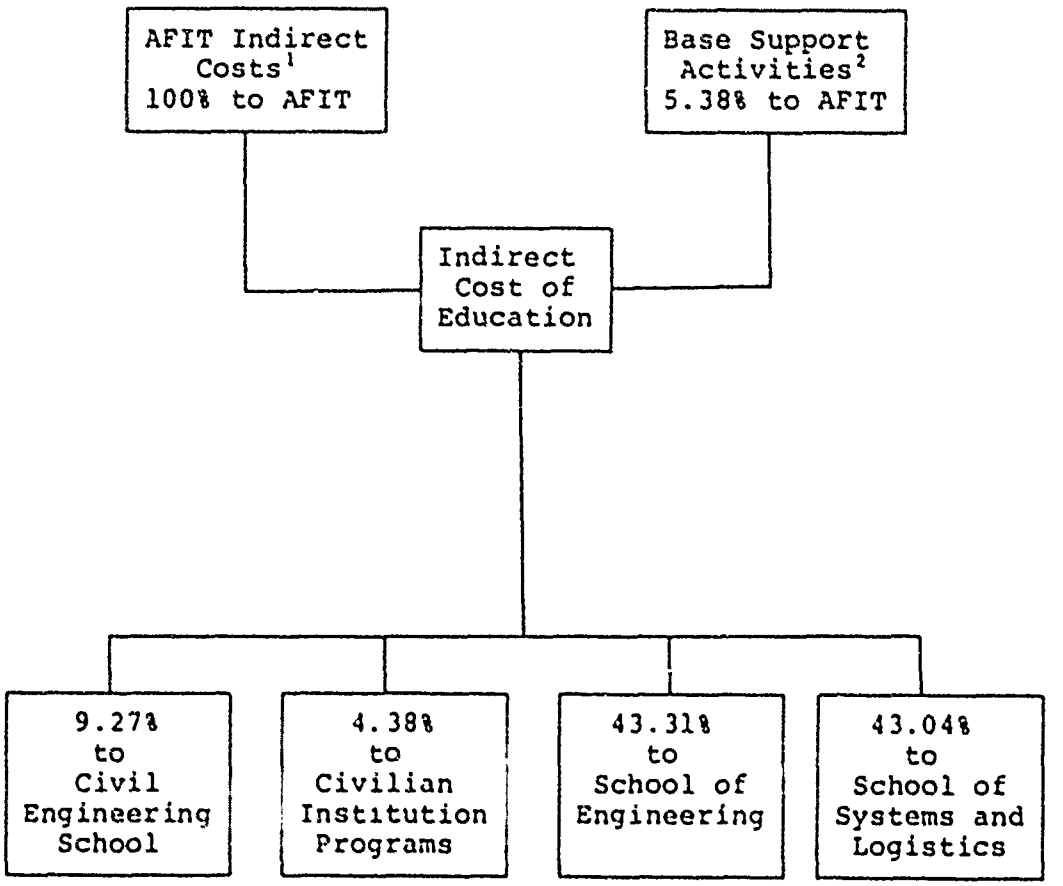


[1]AFIT indirect cost, commander, were not allocated using above ratios. See Table 15.

[2]Base support activities, civil engineering and building depreciation costs were not allocated using above ratios. See Tables 14 and 18.

TABLE 17

Method of Allocating Indirect Cost of Education - FY 78



[1]AFIT indirect cost, commander, were not allocated using above ratios. See Table 15.

[2]Base support activities, civil engineering and building depreciation costs were not allocated using above ratios. See Tables 14 and 18.

indirect costs were not allocated in the manner outlined above. Due to the nature of the services that base civil engineering provides to AFIT (e.g., utilities, building maintenance, etc.), it was determined that these costs should be allocated based upon a cost per square foot of building floor space occupied by a given school or the Civilian Institution Program. Specific calculations are contained in Table 18. It should be noted that occupied floor space per school/program includes a prorata share of the floor space occupied by AFIT administrative functions. This allocation technique is consistent with previously defined criteria, (e.g., in proportion to the extent that each cost objective caused the cost to be incurred).

The second exception to the base indirect cost allocation method that has been developed is depreciation costs. These were computed using the straight line method, with a building service life of 40 years and ten percent salvage value (15:82). The depreciation costs attributable to these portions of buildings occupied by AFIT administrative functions were allocated to the three schools and Civilian Institution Program using the ratio developed in Table 14, Item 3. Depreciation costs were identified to cost objectives within a particular school/program based upon the ratio of the cost objective's student weeks to the total AFIT resident student weeks.

TABLE 18

Allocation of Costs for Civil Engineering Services

	FY 77	FY 78
1. Total Civil Engineering operating expenses (36:83; 37:68-84)	41,756,786	42,024,257
2. Total square feet of floor space occupied at WPAFB (34)	12,819,102	12,819,102
3. Cost of Civil Engineering services per square foot occupied	$3.26	$3.28
4. Square feet of floor space occupied by AFIT (41)	355,544	355,544
5. Total Base Civil Engineer costs assigned to AFIT	1,159,073	1,166,184
6. Base Civil Engineer cost assigned to AFIT schools/program:		
a. Civil Engineering School:		
(1) Occupied floor space	56,114	56,114
(2) Applicable Civil Engineer cost	182,933	184,056
b. Civilian Institution Programs:		
(1) Occupied floor space	5,935	5,935
(2) Applicable Civil Engineer cost	19,349	19,469
c. Engineering School:		
(1) Occupied floor space	202,988	202,988
(2) Applicable Civil Engineer cost	661,742	665,800
d. School of Systems and Logistics:		
(1) Occupied floor space	90,506	90,506
(2) Applicable Civil Engineer cost	295,049	296,859

Command Overhead Indirect Costs

This final indirect subcategory's costs were first identified to AFIT as shown in Table 12. Further allocation of these indirect costs to individual cost objectives was accomplished by developing ratios for each cost objective based upon the cost objective's share of the total student weeks of output of the school/program it is associated with.

The rationale for using these particular ratios to allocate AFIT Indirect Costs is in accordance with the criteria cited earlier (e.g., in proportion to the benefits received by the cost objectives), and within the constraint of using existing data sources to the maximum extent feasible.

Summary

In this chapter the basic structure of the cost model has been presented in the form of a matrix. Major categories have been defined along with component cost elements. Using the percentages developed in this chapter, as shown in Tables 16 and 17, the matrix will be used in subsequent chapters to develop the costs for the various schools and programs.

CHAPTER IV

CIVIL ENGINEERING SCHOOL

Overview

The purpose of this chapter is to develop the cost model introduced in Chapter III to accumulate the full costs of the Civil Engineering (CE) School education programs. Cost matrices are presented to derive the cost per student week for the resident and nonresident programs for fiscal years 1977 and 1978. An explanation of how costs were allocated between programs and the rationale for the unique treatment of various cost elements in the matrices are also provided. In addition, cost differences between fiscal years were analyzed to demonstrate the potential management analysis application of the cost model.

The CE School differs from the other AFIT schools and the Civilian Institution Programs in that only resident and nonresident continuing education courses are offered. Included in the nonresident program are on-site seminars and courses taught by telephone (tele-teach) (23:138-145).

Matrix Explanation

The cost data presented in the matrix depicts the total costs by individual cost element and the dollar values allocated to AFIT and the CE School based upon the percentages

developed in Chapter III. The allocation of costs between programs within the CE School was based upon each program's output in terms of student weeks as shown in Table 19. As the total cost for each cost category (by program) was derived, that total was divided by the program's output (in student weeks) to arrive at the cost per student week for each cost category. These costs per student week, by cost category, were subsequently totaled to determine the overall cost per student week for each program within the CE School. The cost matrices for fiscal years 1977 and 1978 are presented in Tables 20 and 21, respectively. One exception to this allocation procedure is that the nonresident program was not allocated costs associated with Wright-Patterson AFB base support since students in this program attend classes/seminars at their home bases.

TABLE 19

Allocation of Indirect Costs Between Civil Engineering School Programs

	FY 77	FY 78
Output in Student Weeks: (24; 25)		
Resident Continuing Education Programs	2,884.96	3,006.64
Nonresident Continuing Education Programs	623.48	550.16
Total CE School Output	3,508.44	3,556.80

TABLE 19 (continued)

	FY 77	FY 78
Percentage of CE School Output:		
Resident Continuing Education Programs	82.23	84.53
Nonresident Continuing Education Programs	17.77	15.47
Total	100.00	100.00

Explanation of Unique Treatment of Cost Elements

The allocation of costs for several cost elements included in the matrices was not in accordance with the percentages developed in Table 19. In addition, various elements of direct cost were specifically identifiable to a particular program within the CE School. This section of the chapter provides an explanation of the rationale for the allocation or exclusion of those costs which are identified by an asterisk in the matrices.

Direct Costs

These costs, which were presented in the RC Manager Monthly Reports, are specifically identifiable to the CE School.

Traveling instructors. This cost element pertains to faculty TDY and per diem for purposes of conducting nonresident courses. Therefore, this element applies only to the nonresident program (2:29).

TABLE 20

Cost Matrix - Civil Engineering School (FY 77)

	Base Support Total	AFIT Total	School Total	Resident Program	Nonresident Program
		5.45%	9.29%	82.23%	17.77%
Direct Costs (36):					
AFIT Direct Costs:					
Faculty and Staff			889,574	731,497	158,077
Faculty and Staff PCS			19,308	15,877	3,431
Faculty and Staff TDY			32,825	26,992	5,833
Traveling Instructors*			21,685	---	21,685
Student TDY and Per Diem*			760,881	760,881	---
Student Research and Field Trips*			---	---	---
Civilian Graduate Education*			---	---	---
Data Automation and Services			---	---	---
Rent and Other Equipment			1,051	864	187
Printing and Reproduction			6,928	5,697	1,231
Contract Education*			---	---	---
Purchased Maintenance and Equipment*			41	34	7
Miscellaneous Contract Services			25,787	21,205	4,582
Supplies and Materiel			50,663	41,660	9,003
Student PCS*			---	---	---
AFIT Direct Cost Total			1,808,743	1,604,707	204,036
Student Weeks (24)			3,508.44	2,884.96	623.48
Cost per Student Week				556.23	327.25

TABLE 20 (continued)

	Base Support Total	AFIT Total	School Total	Resident Program	Nonresident Program
		5.45%	9.29%	82.23%	17.77%
Indirect Costs:					
AFIT Indirect Costs (36):					
Commander*		3,917,738	35,260	28,994	6,266
Information Management		100,196	9,308	7,654	1,654
Supply		87,660	8,144	6,697	1,447
Comptroller		90,934	8,448	6,947	1,501
Data Automation*		66,698	6,196	6,196	—
CSPO		697,792	64,825	53,306	11,519
Communications		28,427	2,641	2,171	469
Graphics		125,857	11,692	9,614	2,078
Headquarters Staff		1,004,643	93,331	76,746	16,585
AFIT Overhead - PCS		38,742	3,599	2,959	640
Director of Administration		155,192	14,417	11,855	2,562
Academic Support		129,764	12,055	9,913	2,142
Minor Construction		51,826	4,815	3,959	856
Academic Library*		369,855	34,360	34,360	—
AFIT Indirect Cost Total		6,865,324	309,091	261,372	47,719
Student Weeks (24)			3,508.44	2,884.96	623.48
Cost per Student Week				90.60	76.54

TABLE 20 (continued)

	Base Support Total	AFIT Total	School Total	Resident Program	Nonresident Program
		5.45%	9.29%	100%	-0-
Indirect Costs (36):					
Base Support Costs:					
Base Commander/Staff	888,877	48,444	4,500		
Staff Judge Advocate	421,067	22,948	2,132		
Chaplain	409,149	22,299	2,072		
Base Comptroller	3,219,902	175,485	16,303		
Transportation	6,437,292	350,832	32,592		
Security Police	2,498,706	136,179	12,651		
Safety	385,934	21,033	1,954		
Supply Administration	5,039,826	274,671	25,517		
Services	4,491,382	244,780	22,740		
Base Plans	142,985	7,793	724		
Disaster Preparedness	63,250	3,447	320		
Civil Engineering*	41,756,786	1,159,073	182,933		
Building Depreciation*		153,626	9,591		
Administrative Communications Costs	799,451	43,570	4,048		
Reproduction	1,760,414	95,943	8,913		
Medical Services	22,478,536	1,225,080	113,810		
Base Support Cost Total	90,793,557	3,985,203	440,800	440,800	
Student Weeks (24)			3,508.44	2,884.96	623.48
Cost per Student Week				152.79	-0-

TABLE 20 (continued)

	Base Support Total	AFIT Total	School Total	Resident Program	Nonresident Program
		5.45%	9.29%	82.23%	17.77%
Indirect Costs (10; 11; 12):					
Command Overhead Costs*:					
Air Force Overhead		52,673	1,649	1,356	293
Air Training Command Overhead		---	---	---	---
Air University Overhead		284,648	9,023	7,420	1,603
Command Overhead			3.17%	82.23%	17.77%
Cost Total		337,321	10,672	8,776	1,896
Student Weeks (24)			3,508.44	2,884.96	623.48
Cost per Student Week				3.04	3.04
			9.29%	82.23%	17.77%
Other Costs (17)*:					
Student Military Pay and Allowances			1,301,261	1,070,016	231,245
Other Costs Total			1,301,261	1,070,016	231,245
Student Weeks (24)			3,508.44	2,884.96	623.48
Cost per Student Week				370.89	370.89

TABLE 20 (continued)

	Base Support Total	AFIT Total	School Total	Resident Program	Nonresident Program
		5.45%	9.29%	82.23%	17.77%
Cost per Student Week Summary:					
AFIT Direct Costs				556.23	327.25
AFIT Indirect Costs				90.60	76.54
Base Support Costs				152.79	---
Command Overhead Costs				3.04	3.04
Student Military Pay and Allowances				370.89	370.89
Unfunded Military Retirement and Civilian Retirement and Disability (40)				144.32	121.76
Total Cost Without Retirement				1,173.55	777.72
Total Cost With Retirement				1,317.87	899.48

TABLE 21

Cost Matrix - Civil Engineering School (FY 78)

	Total Base Support	AFIT Total	School Total	Resident Program	Nonresident Program
				84.53%	15.47%
Direct Costs (37):					
AFIT Direct Costs:					
Faculty and Staff			834,947	705,781	129,166
Faculty and Staff PCS			22,085	18,668	3,417
Faculty and Staff TDY			38,036	32,152	5,884
Traveling Instructors*			19,981	—	19,981
Student TDY and Per Diem*			824,864	824,864	—
Student Research and Field Trips*			—	—	—
Civilian Graduate Education*			—	—	—
Data Automation and Services*			—	—	—
Rent and Other Equipment			188	159	29
Printing and Reproduction			1,946	1,645	301
Contract Education*			—	—	—
Purchased Maintenance and Equipment*			—	—	—
Miscellaneous Contract Services			19,591	15,560	4,031
Supplies and Materiel			28,628	24,199	4,429
Student PCS*			—	—	—
AFIT Direct Cost Total			1,790,266	1,623,028	167,238
Student Weeks (25)			3,556.8	3,006.64	550.16
Cost per Student Week				539.81	303.98

TABLE 21 (continued)

	Total Base Support	AFIT Total	School Total	Resident Program	Nonresident Program
			9.27%	84.53%	15.47%
Indirect Costs (37):					
AFIT Indirect Costs:					
Commander*		3,368,931	30,320	25,629	4,691
Information Management		65,854	6,105	5,161	944
Supply		84,749	7,856	6,641	1,215
Comptroller		76,877	7,126	6,024	1,102
Data Automation*		512,580	47,516	47,516	---
CBPO		715,347	66,313	56,054	10,259
Communications		25,016	2,319	1,960	359
Graphics		109,331	10,135	8,567	1,568
Headquarters Staff		1,066,379	98,853	83,560	15,293
AFIT Overhead - PCS		45,753	4,241	3,585	656
Director of Administration		168,908	15,658	13,236	2,422
Academic Support		105,301	9,761	8,251	1,510
Minor Construction		176,840	16,393	13,857	2,536
Academic Library*		370,618	34,356	34,356	---
AFIT Indirect Cost Total		7,178,169	356,952	314,397	42,555
Student Weeks (25)			3,556.8	3,006.64	550.16
Cost per Student Week				104.57	77.35

TABLE 21 (continued)

	Total Base Support	AFIT Total	School Total	Resident Program	Nonresident Program
		5.38%	9.27%	100%	-0-
Indirect Costs:					
Base Support Costs (37):					
Base Commander/Staff	917,866	49,381	4,578		
Staff Judge Advocate	451,431	24,287	2,251		
Chaplain	47,536	25,574	2,371		
Base Comptroller	3,409,396	183,426	17,004		
Transportation	6,423,667	345,593	32,036		
Security Police	2,617,606	140,827	13,055		
Safety	357,338	19,225	1,782		
Supply Administration	4,828,758	259,787	24,082		
Services	4,598,530	247,401	22,934		
Base Plans	146,884	7,902	733		
Disaster Preparedness	172,848	9,299	862		
Civil Engineering*	42,024,257	1,166,184	184,056		
Building Depreciation*	—	153,626	9,591		
Administrative Communication Costs	909,492	48,931	4,536		
Reproduction	1,875,779	100,917	9,355		
Medical Services	25,079,412	1,349,272	125,078		
Base Support Cost Total	93,860,800	4,131,632	454,304	-0-	
Student Weeks (25)			3,556.8	3,006.64	550.16
Cost per Student Week				151.10	

TABLE 21 (continued)

	Total Base Support	AFIT Total	School Total	Resident Program	Nonresident Program
			3.13%	84.53%	15.47%
Indirect Costs:					
Command Overhead Costs (10; 11; 12)*:					
Air Force Overhead	52,673	52,673	1,649	1,394	255
Air Training Command Overhead		4,664,238	145,991	123,406	22,585
Air University Overhead		349,876	10,951	9,257	1,694
Command Overhead Cost Total		5,066,787	158,591	134,057	24,534
Student Weeks (25)			3,556.8	3,006.64	550.16
Cost per Student Week				44.59	44.59
Other Costs (17)*:					
Student Military Pay and Allowances			1,385,929	1,171,556	214,373
Other Costs Total			1,385,929	1,171,556	214,373
Student Weeks (25)			3,556.8	3,006.64	550.16
Cost per Student Week				389.66	389.66
Cost per Student Week Summary:					
AFIT Direct Costs				539.81	303.98
AFIT Indirect Costs				104.57	77.35
Base Support Costs				151.10	---
Command Overhead Costs				44.59	44.59
Student Military Pay and Allowances				389.66	389.66

TABLE 21 (continued)

	Total Base Support	AFIT Total	School Total	Resident Program	Nonresident Program
			3.13%	84.53%	15.47%
Unfunded Military Retirement and Civilian Retirement and Disability (40)				145.65	123.61
Total Cost Without Retirements				1,229.73	815.58
Total Cost With Retirement				1,375.38	939.19

Student TDY travel and per diem. This cost element applies only to the resident program. Such costs, if any, for the nonresident program are not funded by AFIT and were not included for the purposes of this study (23:129).

Student research and field trips. This cost element does not apply to the CE School since continuing education programs do not include accomplishment of thesis research or field trips (23:138-145).

Civilian graduate education. This cost element applies only to graduate degree programs. Therefore, no costs were incurred by the CE School.

Data automation and services. No costs were recorded in the RC Manager Monthly Reports for this cost element (36; 37).

Contract education. No costs were recorded in the RC Manager Monthly Reports for this cost element (36; 37).

Purchased maintenance and equipment. This element of cost was incurred by the Civil Engineering School only in fiscal year 1977 per the RC Manager Monthly Reports (36; 37).

Student PCS. This cost element does not apply to the CE School since only continuing education courses are offered (23:138-145).

Indirect Costs

Commander. Allocation of costs for this cost element was explained in Chapter III. This element of cost is primarily for military pay and allowances of AFIT personnel, including students, in transit between PCS assignments. Therefore, only the costs associated with the CE School faculty and staff (including the allocation of the CE School's share of AFIT overhead personnel) are included (13).

Data automation. This element of cost applies only to the resident program since the data automation facilities are not available to the nonresident students.

Academic library. This element of cost applies only to the resident program since the library facilities are not available to the nonresident students.

Civil engineering. Allocation of civil engineering base support costs was based upon the number of square feet of building space occupied by the CE School in proportion to the base total. The development of this allocation was shown in Chapter III, Table 16.

Building depreciation. This element of base support costs was based upon the building space occupied by the CE School. A detailed explanation of how these costs were derived was presented in Chapter III.

Command overhead. Allocation of command overhead costs to the AFIT schools/program was based upon the total of each school's/program's faculty, staff, and output (in student weeks) as a percentage of the AFIT total as shown in Chapter III, Table 12.

Other Costs

Student military pay and allowances. Allocation of this cost was based on actual output, in student weeks, of each program (17; 24; 25).

Analysis of Cost Differences Between Fiscal Years

A summary of the cost per student week (as presented in Tables 20 and 21) by CE School program and fiscal year is provided in Tables 22 and 23. To enhance the utility of the model by providing a forecasting capability, a comparison of costs per student week by cost category, program, and fiscal year was accomplished. For any significant differences identified, a review of the cost matrices was conducted to determine the cause(s) and explanations for the differences are provided as footnotes to the applicable tables. Such an analysis may be useful for determining the elements of cost which fluctuate by fiscal year and the relative degree of fluctuation. With this information, a base cost per student week for a program may be established and an estimate of the expected cost increases/decreases may be derived.

TABLE 22

Analysis of Cost Differences Between Fiscal Years:
Civil Engineering School - Resident Program
(Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 539.81	$ 556.23	$(16.42)[1]
Indirect Costs:			
AFIT Indirect Costs	104.57	90.60	13.97[2]
Base Support Costs	151.10	152.79	(1.69)
Command Overhead Costs	44.59	3.04	41.55[3]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[4]
Unfunded Retirement/Disability	145.65	144.32	1.33
Total Cost Without Unfunded Retirement/Disability	$1,229.73	$1,173.55	$ 56.18
Total Cost With Unfunded Retirement/Disability	$1,375.38	$1,317.87	$ 57.51

[1]Decrease in direct costs primarily due to reduction in CE School faculty/staff.

[2]Increase in AFIT indirect costs due to increase in minor construction and data automation cost elements.

[3]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[4]Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 23

Analysis of Cost Differences Between Fiscal Years:
Civil Engineering School - Nonresident Program
(Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 303.98	$ 327.25	$(23.27)[1]
Indirect Costs:			
AFIT Indirect Costs	77.35	76.54	.81
Base Support Costs	0	0	0
Command Overhead Costs	44.59	3.04	41.55[2]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[3]
Unfunded Retirement/Disability	123.61	121.76	1.85
Total Cost Without Unfunded Retirement/Disability	$ 815.58	$ 777.72	$ 37.86
Total Cost With Unfunded Retirement/Disability	$ 939.19	$ 899.48	$ 39.71

[1]Decrease in direct costs primarily due to reduction in CE School faculty/staff.

[2]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[3]Increase in other costs due to pay raise impacting student pay and allowances.

CHAPTER V

CIVILIAN INSTITUTION PROGRAMS

Overview

The purpose of this chapter is to develop the cost model introduced in Chapter II to accumulate the full costs of the programs of the Civilian Institution Programs. Cost matrices are presented to derive the cost per student week for the undergraduate degree, master's degree, doctoral degree, nonmedical continuing education, medical degree, and medical continuing education programs for fiscal years 1977 and 1978. An explanation of how costs were allocated among programs and the rationale for the unique treatment of various cost elements in the matrices are also provided. In addition, cost differences between fiscal years were analyzed to demonstrate the potential management analysis application of the cost model.

Matrix Explanation

The cost data presented in the matrix depicts the total costs by individual cost element and the dollar values allocated to AFIT and the Civilian Institution Programs based upon the percentages developed in Chapter III. The allocation of costs among programs within the Civilian Institution Programs was based upon each program's output

in terms of student weeks as shown in Table 24. As the total cost for each cost category (by program) was derived, that total was divided by the program's output (in student weeks) to arrive at the cost per student week for each cost category. These costs per student week, by cost category, were subsequently totaled to determine the overall cost per student week for each program within the Civilian Institution Programs. The cost matrices for fiscal years 1977 and 1978 are presented in Tables 25 and 26, respectively.

Explanation of Unique Treatment of Cost Elements

The allocation of costs for several cost elements included in the matrices was not in accordance with the percentages developed in Table 24. In addition, the majority of the elements of direct cost were specifically identifiable to a particular program within the Civilian Institution Programs. This section of the chapter provides an explanation of the rationale for the allocation or exclusion of those costs which are identified by an asterisk in the matrices.

Direct Costs

Traveling instructors. This element of cost pertains to TDY and per diem of Air Force faculty for purposes of conducting continuing education courses. Therefore, this cost element

TABLE 24

Allocation of Indirect Costs Among Programs of the Civilian Institution Programs (CIP)

	FY 77	FY 78
Output in Student Weeks (24; 25; 26; 27):		
Nonmedical:		
Master's Degree	$ 22,876.36	$ 17,680.00
Doctoral Degree	6,860.36	7,852.00
Undergraduate Degree	971.88	11,960.00
Continuing Education	4,639.44	4,798.56
Medical:		
Degree	111,488.00	104,312.00
Continuing Education	785.72	1,099.28
Total CIP Output	$147,621.76	$147,701.84
Percentage of Civilian Institution Programs Output:		
Nonmedical:		
Master's Degree	15.50%	11.97%
Doctoral Degree	4.65%	5.32%
Undergraduate Degree	.66%	8.10%
Continuing Education	3.14%	3.25%
Medical:		
Degree	75.52%	70.62%
Continuing Education	.53%	.74%
Total	100.00%	100.00%

TABLE 25

Cost Matrix - Civilian Institution Programs (FY 77)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Program (UECP)	Masters Degree Programs	Doctors of Philosophy Degree Programs	Nonmedical Continuing Education Programs	Medical Degree Programs	Medical Continuing Education Programs
				.6%	15.5%	4.6%	3.1%	25.5%	.5%
Direct Costs (36):									
AFIT Direct Costs:									
Faculty and Staff			691,267	14,043	330,454	99,121	67,051	179,334	1,264
Faculty and Staff PCS			10,970	72	1,700	510	344	8,295	58
Faculty and Staff TDY			40,620	520	24,070	7,219	1,818	6,944	49
Traveling Instructors*			—	—	—	—	—	—	—
Student TDY and Per Diem*			1,328,121	—	—	—	699,994	151,148	276,979
Student Research and Field Trips*			16,061	—	12,356	3,705	—	—	—
Civilian Graduate Education*			—	—	—	—	—	—	—
Other Transportation Charges			—	—	—	—	—	—	—
Data Automation and Services*			—	—	—	—	—	—	—
Rent and Other Equipment*			6,218	—	768	230	—	5,220	—
Printing and Reproduction*			193	5	126	37	25	—	—
Contract Education			7,867,506	27,668	877,914	263,271	1,031,462	5,546,321	120,870
Purchased Maintenance and Equipment*			25	—	—	—	—	25	—
Miscellaneous Contract Services			520,399	4,940	22,577	6,769	72	484,693	1,348
Supplies and Material			405,091	290	6,829	2,048	1,385	394,534	5
Student PCS*			1,632,271	1,635	546,986	82,016	—	999,640	—
AFIT Direct Cost Total			12,318,[illegible]32	51,173	1,823,774	464,926	1,802,151	7,776,144	400,573
Student Weeks (24; 26)			147,621.36	971.88	22,876.36	6,860.36	4,639.44	111,488	785.72
Cost per Student Week				52.67	79.72	67.77	388.44	69.75	509.82
Indirect Costs (36):									
AFIT Indirect Costs:									
Commander*		3,917,738	3,181,203	20,995	493,087	147,926	99,890	2,402,445	16,861
Information Management		100,196	4,799	32	744	223	151	3,624	25
Supply		87,660	4,199	28	651	195	132	3,171	22

TABLE 25 (continued)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Programs (AFIT)	Masters Degree Programs	Doctors of Philosophy Degree Programs	Biomedical Continuing Education Programs	Medical Degree Programs	Medical Continuing Education Programs
		5.4%		.6%	13.3%	4.5%	3.1%	75.5%	.5%
Comptroller		90,934	4,356	29	675	203	137	3,290	23
Data Automation		66,698	3,195	21	495	149	100	2,413	17
OSD		697,792	33,424	221	5,181	1,554	1,050	25,242	177
Communications		28,427	1,362	9	211	63	43	1,029	7
Graphics		125,857	6,029	40	934	280	189	4,553	32
Headquarters Staff		1,004,643	48,122	318	7,459	2,238	1,511	36,342	256
AFIT Overhead - ICS		38,742	1,856	12	288	86	58	1,402	10
Direct of Administration		155,192	7,434	49	1,152	346	233	5,614	39
Academic Support		129,764	6,216	41	963	289	195	4,694	33
Minor Construction		51,826	2,482	16	385	115	78	1,874	13
Academic Library		369,855	17,716	117	2,744	824	556	13,379	94
AFIT Indirect Cost Total		6,865,324	3,322,393	21,928	514,971	154,491	104,323	2,509,072	17,609
Student Weeks (24;26)			147,621.76	971.88	22,876.36	6,860.36	4,639.44	111,488	785.72
Cost per Student Week				22.51	22.51	22.51	22.51	22.51	22.51
Indirect Costs (36):									
Base Support Costs:									
Base Commander/Staff	898,887	48,444	2,320	15	360	108	73	1,752	12
Staff Judge Advocate	421,067	22,948	1,099	7	170	51	35	830	6
Chaplain	409,149	22,299	1,068	7	166	50	34	807	6
Base Comptroller	3,219,902	175,485	8,406	55	1,303	391	264	6,348	45
Transportation	6,437,292	350,832	16,805	111	2,605	781	528	12,691	89
Security Police	2,498,706	136,179	6,523	43	1,011	303	205	4,926	35
Safety	385,934	21,031	1,007	7	156	47	32	760	5
Supply Admin	5,039,826	274,671	13,157	87	2,039	612	413	9,936	70
Services	4,491,382	244,780	11,725	77	1,817	545	367	8,855	62

TABLE 25 (continued)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Program (AECP)	Masters Degree Programs	Doctors of Philosophy Degree Programs	Nonmedical Continuing Education Programs	Medical Degree Program	Medical Continuing Education Programs
		5.45%		.66%	15.50%	4.65%	3.14%	75.52%	.53%
Base Plans	142,985	7,793	373	2	58	17	12	282	2
Disaster Preparedness	63,250	3,447	165	1	26	8	5	125	1
Civil Engineering*	41,756,786	2,159,073	2,087	14	323	97	66	1,576	11
Building Depreciation*		153,626	4,596	30	712	214	144	3,471	24
Administrative Communication Costs	799,451	43,570	19,349	128	2,999	900	607	14,612	103
Reproduction	1,760,414	95,943	1,014	7	157	47	32	766	5
Medical Services	22,478,536	1,225,080	58,681	388	9,096	2,728	1,842	44,316	310
Base Support Cost Total	90,793,557	3,985,203	148,375	979	22,998	6,899	4,659	112,051	786
Student Weeks (24; 26)			147,621.76	971.88	22,876.36	6,860.36	4,639.44	111,488	785.72
Cost per Student Week				1.01	1.01	1.01	1.01	1.01	1.01
Indirect Costs (10; 11; 12):									
Command Overhead Costs*:									
Air Force Overhead			36,234	239	5,616	1,685	1,138	27,364	192
Air Training Command Overhead		--	--	--	--	--	--	--	--
Air University Overhead			197,033	1,303	30,540	9,162	6,183	148,799	1,044
Command Overhead Cost Total			233,267	1,540	36,156	10,847	7,325	176,163	1,236
Student Weeks (24; 26)			147,621.76	971.88	22,876.36	6,860.36	4,639.44	111,488	785.72
Cost per Student Week				1.58	1.58	1.58	1.58	1.58	1.58
Other Costs (17)*:									
Student Military Pay and Allowances			54,601,689	210,038	8,484,719	2,544,471	1,720,743	41,350,299	291,419
Other Costs Total			54,601,689	210,038	8,484,719	2,544,471	1,720,743	41,350,299	291,419
Student Weeks (24; 26)			147,621.76	971.88	22,876.36	6,860.36	4,639.44	111,488	785.72
Cost per Student Week				252.85	370.89	370.89	370.89	370.89	370.89

TABLE 25 (continued)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Program (AECP)	Masters Degree Programs	Doctors of Philosophy Degree Programs	Nonmedical Continuing Education Programs	Medical Degree Programs	Medical Continuing Education Programs
		5.45%		.44%	15.5%	4.65%	3.14%	75.52%	.53%
Cost per Student Week Summary:									
AFIT Direct Costs				52.65	79.72	67.77	388.44	69.75	509.82
AFIT Indirect Costs				22.51	22 51	22.51	22.51	22.51	22.51
Base Support Costs				1 01	1.01	1.01	1.01	1.01	1.01
Command Overhead Costs				1.58	1.58	1.58	1 58	1.58	1.58
Student Military Pay and Allowances				21612	370.89	370.89	370.89	370.89	370.89
Unfunded Military Retirement and Civilian Retirement and Disability (40)				67 71	67.71	67.71	67.71	67.71	67.71
Total Cost without Retirement				293.87	475.71	463.76	784.43	465.74	905.81
Total Cost with Retirement				361.58	543.42	531.47	852.14	533.45	973.52

TABLE 26

Cost Matrix - Civilian Institution Programs (FY 78)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Program (AECP)	Masters Degree Program	Doctors of Philosophy Degree Programs	Biomedical Continuing Education Program	Medical Degree Program	Medical Continuing Education Program
				8 %	11 %	3.3%	3 %	70.6%	.7%
Direct Costs (37):									
AFIT Direct Costs:									
Faculty and Staff			665,552	147,932	218,655	97,139	59,371	140,973	1,482
Faculty and Staff PCS			12,638	1,024	1,511	672	411	8,924	96
Faculty and Staff TDY			49,860	5,970	23,578	10,472	2,356	7,406	78
Traveling Instructors*			---	---	---	---	---	---	---
Student TDY and Per Diem*			1,302,844	---	---	---	725,068	158,294	419,482
Student Research and Field Trips*			9,892	---	6,850	3,042	---	---	---
Civilian Graduate Education*			---	---	---	---	---	---	---
Data Automation and Services*			---	---	---	---	---	---	---
Rent and Other Equipment			101,29	---	---	---	---	101 29	---
Printing and Reproduction*			---	---	---	---	---	---	---
Contract Education			9,900,211	441,777	758,541	338,825	1,077,522	7,001,409	204,143
Purchased Maintenance and Equipment*			49	---	---	---	---	49	---
Miscellaneous Contract Services			371,512	30,175	18,144	8,054	---	314,778	361
Supplies and Material			223,512	4,985	7,364	3,273	2,001	205,885	---
Student PCS*			1,823,041	51,175	515,893	114,559	---	1,141,414	---
AFIT Direct Cost Total			14,369,242	683,013	1,550,542	574,038	1,866,729	9,069,260	625,640
Student Weeks (25; 27)			147,701 84	11,960	17,680	7,852	4,798.56	104,312	1,099.28
Cost per Student Week				57 11	87.70	73.11	389.02	84.97	569 14
Indirect Costs (37):									
AFIT Indirect Costs:									
Commander*		3,368,931	2,698,514	218,579	323,013	143,562	87,701	1,905,691	19,970
Information Management		65,854	2,894	234	345	153	94	2,037	21
Supply		84,749	3,712	301	444	197	121	2,621	27

TABLE 24 (continued)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Program (USAFI)	Masters Degree Program	Doctors of Philosophy Degree Program	Biomedical Continuing Education Programs	Medical Degree Programs	Medical Continuing Education Programs
				5.1%	11.5%	5.1%	1.5%	75.6%	.7%
Comptroller		36,877	1,367	273	401	179	109	2,378	25
Data Automation		512,560	22,451	1,819	2,687	1,194	730	15,855	166
CBPO		715,347	31,332	2,538	3,750	1,667	1,018	22,127	232
Communications		25,016	1,096	89	131	58	36	774	8
Graphics		109,131	4,789	388	573	255	156	3,382	35
Headquarters Staff		1,066,139	46,707	3,782	5,592	2,485	1,517	32,984	346
AFIT Overhead - PCS		65,353	5,004	167	240	107	65	1,415	15
Director of Administration		168,908	7,398	599	886	394	240	5,224	55
Academic Support		105,301	4,612	374	552	245	150	3,257	34
Minor Construction		124,840	7,246	627	927	412	252	5,470	57
Academic Library		370,618	16,233	1,315	1,943	864	528	11,464	120
AFIT Indirect Cost Total		7,221,922	2,852,845	231,080	341,496	151,772	92,717	2,014,679	21,111
Student Weeks (25; 27)			147,701.84	11,960	17,680	7,852	4,798.56	104,312	1,099.28
Cost per Student Week				19.31	19.31	19.31	19.31	19.31	19.31
Indirect Costs (27):									
Base Support Costs:									
Base Commander/Staff	917,866	69,381	2,163	175	259	115	70	1,528	16
Staff Judge Advocate	451,431	24,287	1,064	86	127	57	35	751	8
Chaplain	47,536	25,574	1,120	91	134	60	36	791	8
Base Comptroller	1,409,396	183,426	8,034	651	962	427	261	5,674	59
Transportation	6,423,647	345,593	15,137	1,226	1,812	805	492	10,690	112
Security Police	2,617,606	140,827	6,168	497	735	327	199	4,335	45
Safety	357,138	19,225	842	68	101	45	27	595	6
Supply Admin	4,878,758	259,747	11,379	922	1,362	605	370	8,036	84
Services	4,598,530	247,401	10,836	878	1,297	576	352	7,652	80
Base Plans	146,884	7,902	346	28	41	18	11	244	3
Disaster Preparedness	172,848	9,299	407	33	49	22	13	287	3
Civil Engineering*	42,024,257	1,768,181	2,141	174	257	114	70	1,513	16

TABLE 26 (continued)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Program (AECP)	Masters Degree Programs	Doctors of Philosophy Degree Programs	Nonmedical Continuing Education Program	Medical Degree Programs	Medical Continuing Education Program
				8.11	11.97	5.32	3.25	70.62	.74
Building Depreciation*	- -	151,626	4,420	358	529	235	144	3,121	33
Administrative Communication Costs	909,492	48,911	19,469	1,577	2,330	1,036	633	13,749	144
Reproduction	1,875,779	100,917	1,014	82	121	54	33	716	8
Medical Services	25,079,412	1,345,272	59,128	4,789	7,078	3,146	1,922	41,756	438
Base Support Cost Total	91,860,790	4,711,629	143,640	11,635	17,194	7,642	4,668	101,438	1,063
Student Weeks (25; 27)			147,701.84	11,960	17,680	7,852	4,798.56	104,312	1,099.28
Cost per Student Week				.97	.97	.97	.97	.97	.97
Indirect Costs (10; 11; 12):									
Command Overhead Costs*:									
Air Force Overhead			36,234	2,935	4,337	1,928	1,178	25,588	268
Air Training Command Overhead			3,208,529	259,891	384,062	170,694	104,277	2,265,864	23,743
Air University Overhead			240,680	19,495	28,809	12,804	7,822	169,968	1,781
Command Overhead Cost Total				282,321	417,208	185,426	113,277	2,461,420	25,792
Student Weeks (25; 27)			147,701.84	11,960	17,680	7,852	4,798.56	104,312	1,099.28
Cost per Student Week				23.60	23.60	23.60	23.60	23.60	23.60
Other Costs (17)*:									
Student Military Pay and Allowances				2,701,420	6,889,189	3,059,610	1,869,807	40,646,214	428,345
Other Costs Total				2,701,420	6,889,189	3,059,610	1,869,807	40,646,214	428,345
Student Weeks (25; 27)			147,701.84	11,960	17,680	7,852	4,798.56	104,312	1,099.28
Cost per Student Week				389.66	389.66	389.66	389.66	389.66	389.66

TABLE 24 (continued)

	Total Base Support	AFIT Total	School Total	Undergraduate Degree Program (AECP)	Masters Degree Programs	Doctors of Philosophy Degree Programs	Nonmedical Continuing Education Programs	Medical Degree Programs	Medical Continuing Education Programs
				8.1%	11.47%	5.32%	3.25%	70.62%	.74%
Cost per Student Week Summary:									
AFIT Direct Costs				57.11	87.70	73.11	389.02	84.97	569.14
AFIT Indirect Costs				19.31	19.31	19.31	19.31	19.31	19.31
Base Support Costs				.97	.97	.97	.97	.97	.97
Command Overhead Costs				21.60	21.60	21.60	21.60	21.60	21.60
Student Military Pay and Allowances				68.25	68.25	68.25	68.25	68.25	68.25
Unfunded Military Retirement and Civilian Retirement and Disability (40)				226.04	389.66	389.66	389.66	389.66	389.66
Total Cost Without Retirement				327.03	521.24	506.65	822.56	518.51	1,002.68
Total Cost With Retirement				395.28	589.49	574.90	890.81	586.76	1,070.93

does not apply to the Civilian Institution Programs since the faculty is not comprised of members of the Air Force (2:29).

Student TDY travel and per diem. This cost element pertains only to the continuing education programs. Students in all other programs are in a PCS status (23:148).

Student research and field trips. This element of cost applies only to students in the nonmedical master's and doctoral degree programs. (23:148-151).

Civilian graduate education. No costs were recorded in the RC Manager Monthly Reports for this cost element (36; 37).

Data automation and services. No costs were recorded in the RC Manager Monthly Reports for this cost element (36; 37).

Rent and other equipment. These costs were obtained directly from the RC Manager Monthly Reports. Expenses for this element of cost were not incurred by all programs within the Civilian Institution Programs (36; 37).

Printing and reproduction. This element of cost was not incurred by all programs within the Civilian Institution Programs per the RC Manager Monthly Reports (36; 37).

Purchased maintenance and equipment. These costs were obtained directly from the RC Manager Monthly Reports. Expenses for this element of cost were not incurred by all programs within the Civilian Institution Programs (36; 37).

Student PCS. The computation of student PCS costs was illustrated in Chapter III, Table 8. These costs relate only to Civilian Institution Programs requiring a PCS move (not continuing education programs). For the purposes of this research, it was determined that the average length of a master's degree program was 18 months, a doctoral degree program 36 months, an undergraduate degree program 24 months, and the average length of a medical degree program 48 months. The number of PCS moves attributed to a specific program was based upon the number of student man years, by program, divided by the average length of the program (23:148-151).

Indirect Costs

Commander. Allocation of costs for this cost element was explained in Chapter III. This element of cost is primarily for military pay and allowances of AFIT personnel, including students, in transit between PCS assignments. Therefore, the costs associated with the Civilian Institution Programs staff (including the allocation of an appropriate share of AFIT overhead personnel) and PCS students are included (13).

Civil engineering. Allocation of civil engineering base support costs was based upon the number of square feet of building space occupied by the Civilian Institution Programs staff in proportion to the base total. The development of this allocation was illustrated in Chapter III, Table 16.

Building depreciation. This element of base support costs was based upon the building space occupied by the Civilian Institution Programs staff. A detailed explanation of how these costs were derived was presented in Chapter III.

Command overhead. Allocation of command overhead costs to the AFIT schools/program was based upon the total of each school's/program's faculty (none for the Civilian Institution Programs), staff, and output (in student weeks) as a percentage of the AFIT total as shown in Chapter III, Table 12.

Other Costs

Student military pay and allowances. Allocation of this cost was based upon the actual output, in student weeks, of each program. The pay grade used to compute these costs for all programs except the airman education and commissioning program (AECP) was a married captain with over eight years of service (17; 24; 25; 26; 27).

Analysis of Cost Differences Between Fiscal Years

A summary of the cost per student week (as presented in Tables 25 and 26) by program within the Civilian Institution Programs and fiscal year is provided in Tables 27 through 32. To enhance the utility of the model by providing a forecasting capability, a comparison of costs per student week by cost category, program, and fiscal year was accomplished. For any significant differences identified, a review of the cost matrices was conducted to determine the cause(s) and explanations for the differences are provided as footnotes to the applicable tables. Such an analysis may be useful for determining the elements of cost which fluctuate by fiscal year and the relative degree of fluctuation. With this information, a base cost per student week for a program may be established and an estimate of the expected cost increases/decreases may be derived.

TABLE 27

Analysis of Cost Differences Between Fiscal Years:
Civilian Institution Programs - Undergraduate
Degree Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 57.11	$ 52.65	$ 4.46
Indirect Costs:			
AFIT Indirect Costs	19.31	22.51	(3.20)
Base Support Costs	.97	1.01	(.04)
Command Overhead Costs	23.60	1.58	22.02[1]
Other Costs (Student Pay & Allow.)	226.04	216.12	9.92[2]
Unfunded Retirement/Disability	68.25	67.71	.54
Total Cost Without Unfunded Retirement/Disability	$ 327.03	$ 293.87	$ 33.16
Total Cost With Unfunded Retirement/Disability	$ 395.28	$ 361.58	$ 33.70

[1] Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[2] Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 28

Analysis of Cost Differences Between Fiscal Years: Civilian Institution Programs - Master's Degree Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs	$ 87.70	$ 79.92	$ 7.98
Indirect Costs:			
AFIT Indirect Costs	19.31	22.51	(3.20)
Base Support Costs	.97	1.01	(.04)
Command Overhead Costs	23.60	1.58	22.02[1]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[2]
Unfunded Retirement/Disability	68.25	67.71	.54
Total Cost Without Unfunded Retirement/Disability	$ 521.24	$ 475.71	$ 45.53
Total Cost With Unfunded Retirement/Disability	$ 589.49	$ 543.42	$ 46.07

[1] Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[2] Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 29

Analysis of Cost Differences Between Fiscal Years: Civilian Institution Programs - Doctoral Degree Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 73.11	$ 67.77	$ 5.34
Indirect Costs:			
AFIT Indirect Costs	19.31	22.51	(3.20)
Base Support Costs	.97	1.01	(.04)
Command Overhead Costs	23.60	1.58	22.02[1]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[2]
Unfunded Retirement/Disability	68.25	67.71	.54
Total Cost Without Unfunded Retirement/Disability	$ 506.65	$ 463.76	$ 42.89
Total Cost With Unfunded Retirement/Disability	$ 574.90	$ 531.47	$ 43.43

[1]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[2]Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 30

Analysis of Cost Differences Between Fiscal Years: Civilian Institution Programs - Nonmedical Continuing Education Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 389.02	$ 388.44	$ .58
Indirect Costs:			
AFIT Indirect Costs	19.31	22.51	(3.20)
Base Support Costs	.97	1.01	(.04)
Command Overhead Costs	23.60	1.58	22.02[1]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[2]
Unfunded Retirement/Disability	68.25	67.71	.54
Total Cost Without Unfunded Retirement/Disability	$ 322.56	$ 784.43	$ 38.13
Total Cost With Unfunded Retirement/Disability	$ 890.81	$ 852.14	$ 38.67

[1] Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[2] Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 31

Analysis of Cost Differences Between Fiscal Years: Civilian Institution Programs - Medical Degree Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 84.97	$ 69.75	$ 15.22[1]
Indirect Costs:			
AFIT Indirect Costs	19.31	22.51	(3.20)
Base Support Costs	.97	1.01	(.04)
Command Overhead Costs	23.60	1.58	22.02[2]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[3]
Unfunded Retirement/Disability	68.25	67.71	.54
Total Cost Without Unfunded Retirement/Disability	$ 518.51	$ 465.74	$ 52.77
Total Cost With Unfunded Retirement/Disability	$ 586.76	$ 533.45	$ 53.31

[1]Increase in direct costs due to increase in tuition costs.

[2]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[3]Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 32

Analysis of Cost Differences Between Fiscal Years: Civilian Institution Programs - Medical Continuing Education Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 569.14	$ 509.82	$ 59.32[1]
Indirect Costs:			
AFIT Indirect Costs	19.31	22.51	(3.20)
Base Support Costs	.97	1.01	(.04)
Command Overhead Costs	23.60	1.58	22.02[2]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[3]
Unfunded Retirement/Disability	68.25	67.71	.54
Total Cost Without Unfunded Retirement/Disability	$1,002.68	$ 905.81	$ 96.87
Total Cost With Unfunded Retirement/Disability	$1,070.93	$ 973.52	$ 97.41

[1] Increase in direct costs due to increase in tuition costs.

[2] Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[3] Increase in other costs due to pay raise impacting student pay and allowances.

CHAPTER VI

SCHOOL OF ENGINEERING

Overview

The purpose of this chapter is to develop the cost model introduced in Chapter III to accumulate the full costs of the School of Engineering education programs. Cost matrices are presented to derive the cost per student week for the Master of Science, Doctor of Philosophy, and continuing education programs for fiscal years 1977 and 1978. An explanation of how costs were allocated among programs and the rationale for the unique treatment of various cost elements in the matrices are also provided. In addition, cost differences between fiscal years were analyzed to demonstrate the potential management analysis application of the cost model.

Matrix Explanation

The cost data presented in the matrix depicts the total costs by individual cost element and the dollar values allocated to AFIT and the School of Engineering based upon the percentages developed in Chapter III. The allocation of costs among programs within the School of Engineering was based upon each program's output in terms of student weeks as shown in Table 33. As the total cost for each cost

category (by program) was derived, that total was divided by the program's output (in student weeks) to arrive at the cost per student week for each cost category. These costs per student week, by cost category, were subsequently totaled to determine the overall cost per student week for each program within the School of Engineering. The cost matrices for fiscal years 1977 and 1978 are presented in Tables 34 and 35 respectively.

TABLE 33

Allocation of Indirect Costs Among School of Engineering Programs

	FY 77	FY 78
Output in Student Weeks: (24; 25; 26; 27)		
Master of Science Programs	16,419.00	16,463.20
Doctor of Philosophy Programs	1,293.76	1,623.44
Continuing Education Programs	1,048.32	787.80
Total School of Engineering Output	18,761.08	18,874.44
Percentage of School of Engineering Output:		
Master of Science Programs	87.52	87.23
Doctor of Philosophy Programs	6.89	8.60
Continuing Education Programs	5.59	4.17
Total	100.00	100.00

Explanation of Unique Treatment of Cost Elements

The allocation of costs for several cost elements included in the atrices was not in accordance with the percentages developed in Table 33. In addition, various elements of direct cost were specifically identifiable to a

TABLE 14

Cost Matrix - School of Engineering (FY 77)

	Total Base Support	AFIT Total	School Total	Masters Program	Doctor of Philosophy Program	Continuing Education
		5,451	87,458	87,526	6,891	5,591
Direct Costs:						
AFIT Direct Costs (36):						
Faculty and Staff			3,133,061	2,742,055	215,868	174,138
Faculty and Staff PCS			34,449	30,149	2,373	1,926
Faculty and Staff TDY			60,173	52,663	4,146	3,364
Traveling Instructors*			3,112	---	---	3,112
Student TDY and Per Diem*			97,368	---	---	97,368
Student Research and Field Trips*			18,913	17,532	1,381	---
Civilian Graduate Education*			---	---	---	---
Data Automation and Services*			27,468	24,040	1,893	1,535
Rent and Other Equipment			81,395	71,184	5,604	4,457
Printing and Reproduction			937	820	65	52
Contract Education			4,515	3,952	311	252
Purchased Maintenance and Equipment			10,358	9,065	714	579
Miscellaneous Contract Services			55,903	48,926	3,852	3,125
Supplies and Material			159,349	139,462	10,979	8,908
Student PCS*			415,784	392,583	23,201	---
AFIT Direct Cost Total			4,102,724	3,532,430	270,388	299,906
Student Weeks (24; 26)			18,761.00	16,419	1,293.76	1,048.32
Cost per Student Week				215.14	208.99	286.08
Indirect Costs:						
AFIT Indirect Costs (36):						
Commander*		1,917,738	454,458	397,742	31,312	25,404
Information Management		100,196	43,546	38,111	3,000	2,434
Supply		87,660	38,097	33,342	2,625	2,130
Comptroller		90,934	39,519	34,587	2,723	2,209

TABLE 14 (continued)

	Total Base Support	AFIT Total	School Total	Masters Program	Doctor of Philosophy Program	Continuing Education
		5,458	81,788	87,526	2,891	5,598
Data Automation	66,698	66,698	28,987	25,369	1,997	1,620
CBPO		697,792	303,261	265,414	20,895	16,952
Communications		28,427	12,354	10,812	851	691
Graphics		125,857	54,697	47,871	3,769	3,058
Headquarters Staff		1,004,643	436,619	382,129	30,083	24,407
AFIT Overhead - PCS		38,742	16,837	14,736	1,160	941
Director of Administration		155,192	67,446	59,029	4,647	3,770
Academic Support		129,764	56,396	49,358	3,886	3,153
Minor Construction		51,826	22,524	19,713	1,552	1,259
Academic Library		369,855	160,739	140,679	11,075	8,985
AFIT Indirect Cost Total		6,865,324	1,735,480	1,518,892	119,515	97,013
Student Weeks (24; 26)			18,761.08	16,419	1,293.76	1,048.32
Cost per Student Week				92.50	92.50	92.50
Indirect Costs:						
Base Support Costs (36):						
Base Commander/Staff	888,877	48,444	21,055	18,427	1,451	1,177
Staff Judge Advocate	421,067	22,948	9,973	8 729	687	557
Chaplain	409,149	22,299	9,691	8,482	668	542
Base Comptroller	3,219,902	175,495	76,265	66,747	5,255	4,263
Transportation	6,437,292	350,832	152,472	133,444	10,505	8,523
Security Police	2,498,706	136,179	59,183	51,797	4,078	3,308
Safety	385,934	21,033	9,141	8,000	630	511
Supply Admin	5,039,826	274,671	119,372	104,474	8,225	6,673
Services	4,491,382	244,780	106,381	93,105	7,330	5,947
Base Plans	142,985	7,793	3,387	2,964	233	189
Disaster Preparedness	63,250	3,447	1,498	1,311	103	84
Civil Engineering*	41,756,786	1,159,073	661,742	579,158	45,593	36,992

TABLE 14 (continued)

	Total Base Support	AFIT Total	School Total	Masters Program	Doctor of Philosophy Program	Continuing Education
		5,456	31,461	87,525	6,896	5,596
Building Depreciation*		153,626	76,030	66,541	5,238	4,250
Administrative Communication Costs	799,451	43,570	18,935	16,572	1,305	1,058
Reproduction	1,760,414	95,943	41,697	36,493	2,873	2,331
Medical Services	22,478,536	1,225,080	532,470	465,974	36,684	29,762
Base Support Cost Total	90,793,557	3,985,203	1,899,342	1,662,217	130,858	106,167
Student Weeks (24; 26)			18,761.08	16,419	1,293.76	1,048.32
Indirect Costs:						
Command Overhead Costs (10; 11; 12)*:						
Air Force Overhead		52,673	7,079	6,195	488	396
Air Training Command Overhead		---	---	---	---	---
Air University Overhead		284,648	38,654	33,832	2,663	2,161
Command Overhead Cost Total		337,321	45,735	40,027	3,151	2,557
Student Weeks (24; 26)			18,761.08	16,419	1,293.76	1,048.32
Cost per Student Week				2.44	2.44	2.44
Other Costs (17)*:						
Student Military Pay and Allowances			6,958,384	6,089,719	479,849	388,816
Other Costs Total			6,958,384	6,089,719	479,849	388,816
Student Weeks (24; 26)			18,761.08	16,419	1,293.76	1,048.32
Cost per Student Week				370.89	370.89	370.89
Cost per Student Week Summary						
AFIT Direct Costs				215.14	208.99	286.08
AFIT Indirect Costs				92.50	92.50	92.50

TABLE 34 (continued)

	Total Base Support	AFIT Total	School Total	Masters Program	Doctor of Philosophy Program	Continuing Education
		5.456	41.766	87.534	4.891	5.591
Base Support Costs				101.23	101.23	101.23
Command Overhead Costs				2.44	2.44	2.44
Student Military Pay and Allowances				370.89	370.89	370.89
Uniformed Military Retirement and Civilian Retirement and Disability (40)				124.89	124.83	124.92
Total Cost Without Retirement				782.20	776.05	853.14
Total Cost With Retirement				907.09	900.88	978.06

TABLE 35 (continued)

	Total Base Support	AFIT Total	School Total	Masters Program	Doctor of Philosophy Program	Continuing Education
			[illegible]	87.2%	8.6%	4.1%
Data Automation		512,580	221,999	193,650	19,092	9,257
CSFO		715,347	309,817	270,253	26,644	12,919
Communications		25,016	10,834	9,450	932	452
Graphics		109,331	47,351	41,304	4,072	1,975
Headquarters Staff		1,046,379	461,849	402,872	39,719	19,159
AFIT Overhead - FCS		45,753	19,816	17,286	1,704	826
Director of Administration		168,908	73,154	63,812	6,291	3,051
Academic Support		105,301	45,606	39,782	3,922	1,902
Minor Construction		176,840	76,589	66,809	6,587	3,194
Academic Library		370,618	160,515	140,017	13,804	6,693
AFIT Indirect Cost Total		7,178,169	1,964,013	1,713,209	168,905	81,899
Student Weeks (25; 27)			18,874.44	16,463.2	1,623.44	787.8
Cost per Student Week				104.06	104.06	104.06
Indirect Costs (37):						
Base Support Costs:						
Base Commander/Staff	917,866	49,381	21,186	18,655	1,839	892
Staff Judge Advocate	451,431	24,287	10,419	9,176	905	439
Chaplain	475,362	25,574	11,076	9,662	953	462
Base Controller	3,409,396	183,426	79,441	69,296	6,832	3,313
Transportation	6,421,667	345,593	149,677	130,563	12,872	6,242
Security Police	2,617,606	140,827	60,992	53,203	5,245	2,543
Safety	357,338	29,225	8,926	7,263	716	347
Supply Admin	4,828,758	259,787	112,514	98,146	9,676	4,692
Services	4,598,530	247,401	107,149	93,466	9,215	4,468
Base Plans	146,884	7,902	3,422	2,985	294	143
Disaster Preparedness	172,848	9,299	4,028	3,514	346	168

TABLE 35 (continued)

	Total Base Support	AFIT Total	School Total	Masters Program	Doctor of Philosophy Program	Continuing Education
			43,318	37,238	8,604	4,176
Civil Engineering*	42,024,257	1,768,181	665,800	580,777	57,258	27,763
Building Depreciation*	---	153,626	76,030	66,321	6,539	3,170
Administrative Communication Costs	909,492	48,911	21,192	18,486	1,823	884
Reproduction	1,875,779	100,917	43,707	38,126	3,759	1,823
Medical Services	25,079,412	1,349,272	584,369	509,745	50,256	24,367
Base Support Cost Total	94,288,626	4,733,629	1,959,628	1,709,384	168,528	81,716
Student Weeks (25; 27)			18,874.44	16,463.2	1,623.44	787.8
Cost per Student Week				103.82	103.82	103.82
Indirect Costs:						
Command Overhead Costs (10; 11; 12)*:						
Air Force Overhead		52,673	7,079	6,175	609	295
Air Training Command Overhead		4,664,238	626,874	546,822	53,911	26,141
Air University Overhead		349,876	47,023	41,018	4,044	1,961
Command Overhead Cost Total		5,066,787	680,976	594,015	58,563	28,397
Student Weeks (25; 27)			18,874.44	16,463.2	1,623.44	787.8
cost per Student Week				36.08	36.08	36.08
Other Costs (17)*:						
Student Military Pay and Allowances			7,354,541	6,414,987	632,583	306,971
Other Costs Total			7,354,541	6,414,987	632,583	306,971
Student Weeks (25; 27)			18,974.44	16,463.2	1,623.44	787.3
Cost per Student Week				389.66	389.66	389.66
Cost per Student Week Summary:						
AFIT Direct Costs				231.63	224.30	322.20
AFIT Indirect Costs				104.06	104.06	104.06

TABLE 35 (continued)

	Total Base Support	AFIT Total	School Total	Masters Program	Doctor of Philosophy Program	Continuing Education
			41.316	87.236	8.606	4.176
Base Support Costs				103.82	103.82	103.82
Command Overhead Costs				36.08	36.08	36.08
Student Military Pay and Allowances				389.66	389.66	389.66
Unfunded Military Retirement and Civilian Retirement and Disability (40)				132.48	132.48	132.48
Total Cost Without Retirement				865.25	857.92	955.82
Total Cost With Retirement				997.73	990.40	1,088.30

particular program within the School of Engineering. This section of the chapter provides an explanation of the rationale for the allocation or exclusion of those costs which are identified by an asterisk in the matrices.

Direct Costs

Traveling instructors. This element of cost pertains to faculty TDY and per diem for purposes of conducting continuing education courses. Therefore, this element applies only to the continuing education program (2:29).

Student TDY travel and per diem. This cost element applies only to the continuing education programs since students in the Master of Science and Doctor of Philosophy programs are in a PCS status (23:20-88).

Student research and field trips. This cost element applies to TDY and per diem relating to the Master of Science and Doctor of Philosophy programs. Continuing education programs do not include accomplishment of thesis research or field trips.

Civilian graduate education. No costs were recorded in the RC Manager Monthly Reports for this cost element.

Data automation and services. This element of cost was incurred by the School of Engineering only in fiscal year 1977 per the RC Manager Monthly Reports (36; 37).

Student PCS. The computation of student PCS costs was illustrated in Chapter III, Table 8. These costs relate only to the Master of Science and Doctor of Philosophy programs. For the purposes of this research, it was determined that the average length of a Master of Science program was 18 months and the average length of a Doctor of Philosophy program was 24 months. Therefore, the number of PCS moves attributed to a specific program was based upon the number of student man years, by program, divided by the average length of the program (23:20-88).

Indirect Costs

Commander. Allocation of costs for this cost element was explained in Chapter III. This element of cost is primarily for military pay and allowances of AFIT personnel, including students, in transit between PCS assignments. Therefore, the costs associated with the School of Engineering faculty, staff (including the allocation of an appropriate share of AFIT overhead personnel), and PCS students are included (13).

Civil engineering. Allocation of civil engineering base support costs was based upon the number of square feet of building space occupied by the School of Engineering in proportion to the base total. The development of this allocation was illustrated in Chapter III, Table 18.

Building depreciation. This element of base support costs was based upon the building space occupied by the School of Engineering. A detailed explanation of how these costs were derived was presented in Chapter III.

Command overhead. Allocation of command overhead costs to the AFIT schools/program was based upon the total of each school's/program's faculty, staff, and output (in student weeks) as a percentage of the AFIT total as shown in Chapter III, Table 12.

Other Costs

Student military pay and allowances. Allocation of this cost was based on the actual output, in student weeks, of each program (17; 24; 25; 26; 27).

Analysis of Cost Differences Between Fiscal Years

A summary of the cost per student week (as presented in Tables 34 and 35) by School of Engineering program and fiscal year is provided in Tables 36 through 38. To enhance the utility of the model by providing a forecasting capability, a comparison of costs per student week by cost category, program, and fiscal year was accomplished. For any significant differences identified, a review of the cost matrices was conducted to determine the cause(s) and explanations for the differences are provided as footnotes to the applicable tables. Such an analysis may be useful

TABLE 36

Analysis of Cost Differences Between Fiscal Years:
School of Engineering - Master of Science
Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 231.63	$ 215.14	$ 16.49[1]
Indirect Costs:			
AFIT Indirect Costs	104.06	92.50	11.56[2]
Base Support Costs	103.82	101.23	2.59
Command Overhead Costs	36.08	2.44	33.64[3]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[4]
Unfunded Retirement/Disability	132.48	124.89	7.59[5]
Total Cost Without Unfunded Retirement/Disability	$ 865.25	$ 782.20	$ 83.05
Total Cost With Unfunded Retirement/Disability	$ 997.73	$ 907.09	$ 90.64

[1]Increase in direct costs primarily due to additional School of Engineering faculty/staff.

[2]Increase in AFIT indirect costs due to increase in minor construction and data automation cost elements.

[3]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[4]Increase in other costs due to pay raise impacting student pay and allowances.

[5]Increase due to pay raise and additional personnel.

TABLE 37

Analysis of Cost Differences Between Fiscal Years:
School of Engineering - Doctor of Philosophy
Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 224.30	$ 208.99	$ 15.31[1]
Indirect Costs:			
AFIT Indirect Costs	104.06	92.50	11.56[2]
Base Support Costs	103.82	101.23	2.59
Command Overhead Costs	36.08	2.44	33.64[3]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[4]
Unfunded Retirement/Disability	132.48	124.83	7.65[5]
Total Cost Without Unfunded Retirement/Disability	$ 857.92	$ 776.05	$ 81.87
Total Cost With Unfunded Retirement/Disability	$ 990.40	$ 900.88	$ 89.52

[1]Increase in direct costs primarily due to additional School of Engineering faculty/staff.

[2]Increase in AFIT indirect costs due to increase in minor construction and data automation cost elements.

[3]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[4]Increase in other costs due to pay raise impacting student pay and allowances.

[5]Increase due to pay raise and additional personnel.

TABLE 38

Analysis of Cost Differences Between Fiscal Years: School of Engineering - Continuing Education Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 322.20	$ 286.08	$ 36.12[1]
Indirect Costs:			
AFIT Indirect Costs	104.06	92.50	11.56[2]
Base Support Costs	103.82	101.23	2.59
Command Overhead Costs	36.08	2.44	33.64[3]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[4]
Unfunded Retirement/Disability	132.48	124.92	7.56[5]
Total Cost Without Unfunded Retirement/Disability	$ 955.82	$ 653.14	$102.68
Total Cost With Unfunded Retirement/Disability	$1,088.30	$ 978.06	$110.24

[1]Increase in direct costs primarily due to additional School of Engineering faculty/staff.

[2]Increase in AFIT indirect costs due to increase in minor construction and data automation cost elements.

[3]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[4]Increase in other costs due to pay raise impacting student pay and allowances.

[5]Increase due to pay raise and additional personnel.

for determining the elements of cost which fluctuate by fiscal year and the relative degree of fluctuation. With this information, a base cost per student week for a program may be established and an estimate of the expected cost increases/decreases may be derived.

CHAPTER VII

SCHOOL OF SYSTEMS AND LOGISTICS

Overview

The purpose of this chapter is to develop the cost model introduced in Chapter III to accumulate the full costs of the School of Systems and Logistics education programs. Cost matrices are presented to derive the cost per student week for the Master of Science and continuing education resident and nonresident programs for fiscal years 1977 and 1978. An explanation of how costs were allocated among programs and the rationale for the unique treatment of various cost elements in the matrices are also provided. In addition, cost differences between fiscal years were analyzed to demonstrate the potential forecasting and management analysis applications of the cost model.

Matrix Explanation

The cost data presented in the matrix depicts the total costs by individual cost element and the dollar values allocated to AFIT and the School of Systems and Logistics based upon the percentages developed in Chapter III. The allocation of costs among programs within the School of Systems and Logistics was based upon each program's output in terms of student weeks as shown in Table 39.

As the total cost for each cost category (by program) was derived, that total was divided by the program's output (in student weeks) to arrive at the cost per student week for each cost category. These costs per student week, by cost category, were subsequently totaled to determine the overall cost per student week for each program within the School of Systems and Logistics. The cost matrices for fiscal years 1977 and 1978 are presented in Tables 40 and 41 respectively.

TABLE 39

Allocation of Indirect Costs Among School of Systems and Logistics Programs

	FY 77	FY 78
Output in Student Weeks: (24; 25; 26; 27)		
Master of Science Programs	8,021.00	7,467.72
Continuing Education Resident Programs	10,514.40	11,649.04
Continuing Education Nonresident Programs	1,846.00	2,847.52
Total School of Systems and Logistics Output	20,381.40	21,964.28
Percentage of School of Systems and Logistics Output:		
Master of Science Programs	39.35	34.00
Continuing Education Resident Programs	51.59	53.04
Continuing Education Nonresident Programs	9.06	12.96
Total	100.00	100.00

One exception to the allocation procedure presented in Table 39 is the nonresident continuing education program. Base support costs, relating to Wright-Patterson AFB, were

not allocated to this program since such students attend classes/seminars at their home bases.

Explanation of Unique Treatment of Cost Elements

The allocation of costs for several cost elements included in the matrices was not in accordance with the percentages developed in Table 39. In addition, various elements of direct cost were specifically identifiable to a particular program within the School of Systems and Logistics. This section of the chapter provides an explanation of the rationale for the allocation or exclusion of those costs which are identified by an asterisk in the matrices.

Direct Costs

Traveling instructors. This element of cost pertains to faculty TDY and per diem for purposes of conducting nonresident continuing education courses. Therefore, this element applies only to the nonresident continuing education programs (2:29).

Student TDY travel and per diem. This cost element applies only to the resident continuing education programs. Students in the Master of Science programs are in a PCS status and students attending the nonresident continuing education programs do not perform TDY (23:93-135).

Student research and field trips. This cost element applies to TDY and per diem relating to the Master of Science programs only. Continuing education programs do not include accomplishment of thesis research or field trips (23:93-135).

Civilian graduate education. This element of cost applies to civilian graduate students who attend the Master of Science programs in a TDY status. Accordingly, these costs pertain only to the Master of Science programs but were incurred only in fiscal year 1978 (36; 37).

Data automation and services. This element of cost was incurred by the School of Systems and Logistics only in fiscal year 1977. Additionally, this element of cost does not apply to the continuing education nonresident program since such services are not available to nonresident students (36; 37).

Rent and other equipment. This element of cost was incurred by the School of Systems and Logistics only in fiscal year 1978 per the RC Manager Monthly Reports (36; 37).

Printing and reproduction. This element of cost was incurred by the School of Systems and Logistics only in fiscal year 1978 per the RC Manager Monthly Reports (36; 37).

Contract education. This element of cost was not incurred by the School of Systems and Logistics per the RC Manager Monthly Reports.

Purchased maintenance and equipment. This element of cost was incurred by the School of Systems and Logistics only in fiscal year 1977 per the RC Manager Monthly Reports.

Student PCS. The computation of student PCS costs was illustrated in Chapter III, Table 8. These costs relate only to the Master of Science programs. For the purposes of this research, it was determined that a PCS move was required for each student enrolled in the Master of Science programs (23:93-135).

Indirect Costs

Commander. Allocation of costs for this cost element was explained in Chapter III. This element of cost is primarily for military pay and allowances of AFIT personnel, including students, in transit between PCS assignments. Therefore, the costs associated with the School of Systems and Logistics faculty, staff (including the allocation of an appropriate share of AFIT overhead personnel), and PCS students are included (13).

Data automation. This element of cost applies only to the resident programs since the data automation facilities are not available to the nonresident students.

Academic library. This element of cost applies only to the resident programs since the library facilities are not available to nonresident students.

Civil engineering. Allocation of civil engineering base support costs was based upon the number of square feet of building space occupied by the School of Systems and Logistics in proportion to the base total. The development of this allocation was illustrated in Chapter III, Table 18.

Building depreciation. This element of base support costs was based upon the building space occupied by the School of Systems and Logistics. A detailed explanation of how these costs were derived was presented in Chapter III.

Command overhead. Allocation of command overhead costs to the AFIT schools/program was based upon the total of each school's/program's faculty, staff, and output (in student weeks) as a percentage of the AFIT total as shown in Chapter III, Table 12.

Other Costs

Student military pay and allowances. Allocation of this cost was based upon actual output, in student weeks, of each program (17; 24; 25; 26; 27).

Analysis of Cost Differences Between Fiscal Years

A summary of the cost per student week (as presented in Tables 40 and 41) by School of Systems and Logistics program and fiscal year is provided in Tables 42 through 44. To enhance the utility of the model by providing a forecasting capability, a comparison of costs per student week by cost category, program, and fiscal year was accomplished. For any significant differences identified, a review of the cost matrices was conducted to determine the cause(s) and explanations for the differences are provided as footnotes to the applicable tables. Such an analysis may be useful for determining the elements of cost which fluctuate by fiscal year and the relative degree of fluctuation. With this information, a base cost per student week for a program may be established and an estimate of the expected cost increases/decreases may be derived.

TABLE 40

Cost Matrix - School of Systems and Logistics (FY 77)

	Total Base Support	AFIT Total	School Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
				33.35%	51.59%	9.06%
Direct Costs (36):						
AFIT Direct Costs:						
Faculty and Staff			3,022,584	1,189,387	1,559,351	273,846
Faculty and Staff PCS			38,031	14,965	19,620	3,446
Faculty and Staff TDY			33,859	13,324	17,468	3,068
Traveling Instructors*			22,761	—	—	22,761
Student TDY and Per Diem*			1,283,612	—	1,283,612	—
Student Research and Field Trips*			11,978	11,978	—	—
Civilian Graduate Education*			—	—	—	—
Data Automation and Services*			21,795	9,431	12,364	—
Rent and Other Equipment*			—	—	—	—
Printing and Reproduction*			—	—	—	—
Contract Education*			—	—	—	—
Purchased Maintenance and Equipment			184	72	95	17
Miscellaneous Contract Services			15,782	6,216	8,147	1,430
Supplies and Materials			107,144	42,161	55,276	9,707
Student PCS*			287,676	287,676	—	—
AFIT Direct Cost Total			4,888,364	1,592,107	2,978,091	318,166
Student Weeks (24; 26)			20,381.4	8,021	10,514.4	1,846
Cost per Student Week				198.49	283.24	172.35
Indirect Costs (36):						
AFIT Indirect Costs:						
Commander*		1,917,738	246,817	97,122	127,333	22,362
Information Management		100,196	42,543	16,741	21,948	3,854
Supply		87,660	37,220	14,646	19,202	3,372

TABLE 40 (continued)

	Total Base Support	AFIT Total	School Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
				39,351	51,591	5,068
Comptroller		90,934	38,611	15,121	19,920	3,698
Data Automation*		66,698	28,320	12,254	16,066	—
CDO		697,792	296,282	136,587	152,852	26,843
Communications		28,427	12,070	4,770	6,227	1,093
Graphics		125,957	53,439	21,028	27,569	4,842
Headquarters Staff		1,004,643	426,571	167,856	220,068	38,647
AFIT Overhead - PCS		38,742	16,450	6,473	8,487	1,490
Director of Administration		155,192	65,895	25,930	33,995	5,970
Academic Support		129,764	55,098	21,681	28,425	4,992
Minor Construction		51,826	22,005	8,659	11,352	1,994
Academic Library*		369,855	157,040	67,951	89,089	—
AFIT Indirect Cost Total		6,865,324	1,498,361	596,871	782,533	118,957
Student Weeks (24; 26)			20,381.4	8,021	10,514.4	1,846
Cost per Student Week				74.42	74.42	64.44
				43,270	56,734	
Indirect Costs:						
Base Support Costs (36):						
Base Commander/Staff	888,877	48,444	20,569	8,900	11,669	
Staff Judge Advocate	421,067	22,948	9,744	4,216	5,528	
Chaplain	409,149	22,299	9,468	4,097	5,371	
Base Comptroller	3,219,902	175,485	74,511	32,241	42,270	
Transportation	6,437,292	350,812	148,963	64,456	84,507	
Security Police	2,498,706	136,179	57,822	25,020	32,802	
Safety	385,934	21,033	8,931	3,864	5,067	
Supply Admin	5,039,826	274,671	116,625	50,464	66,161	
Services	4,491,382	244,780	103,934	44,972	58,962	
Base Plans	142,985	7,793	3,309	1,432	1,877	
Disaster Preparedness	63,250	3,447	1,464	633	831	
Civil Engineering*	41,756,786	1,159,973	18,500	8,005	10,495	

TABLE 40 (continued)

	Total Base Support	AFIT Total	School Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
				43,278	56,738	
Building Depreciation*		153,626	40,737	17,627	25,110	
Administrative Communication Costs	799,451	43,570	295,049	127,668	167,381	
Reproduction	1,760,414	95,943	66,991	28,987	38,004	
Medical Services	22,478,536	1,225,080	520,169	225,077	295,092	
Base Support Cost Total	90,793,557	3,985,203	1,496,786	647,659	849,127	
Student Weeks (24; 26)		20,381.4	8,021	10,514.4	1,846	
Cost per Student Week				80.75	80.75	
				39,358	51,552	5,061
Indirect Costs:						
Command Overhead Costs (10; 11; 12)*:						
Air Force Overhead		52,673	7,711	3,034	3,978	699
Air Training Command Overhead		—	—	—	—	—
Air University Overhead		284,648	39,936	15,715	20,603	3,618
Command Overhead Cost Total		337,321	47,647	18,749	24,581	4,317
Student Weeks (24; 26)			20,381.4	8,021	10,514.4	1,846
Cost per Student Week				2.34	2.34	2.34
Other Costs (17)*:						
Student Military Pay and Allowances			7,559,351	2,974,946	3,899,734	684,671
Other Costs Total			7,559,351	2,974,946	3,899,734	684,671
Student Weeks (24; 26)			20,381.4	8,021	10,514.4	1,846
Cost per Student Week				370.89	370.89	370.89

TABLE 40 (continued)

	Total Base Support	AFIT Total	School Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
				39.35%	31.59%	9.00%
Cost per Student Work Summary:						
AFIT Direct Costs				198.49	283.24	172.35
AFIT Indirect Costs				74.42	74.42	64.44
Base Support Costs				80.75	80.75	—
Command Overhead Costs				2.34	2.34	2.34
Student Military Pay and Allowances				370.89	370.89	370.89
Unfunded Military Retirement and Civilian Retirement and Disability (40)				115.12	115.12	101.86
Total Cost Without Retirement				726.89	811.64	610.02
Total Cost With Retirement				842.01	926.76	711.88

TABLE 41

Cost Matrix - School of Systems and Logistics (FY 78)

	Total Base Support	AFIT Total	School Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
				345	51.044	17.965
Direct Costs (37):						
AFIT Direct Costs:						
Faculty and Staff			3,146,404	1,069,777	1,668,852	407,775
Faculty and Staff PCS			43,660	14,776	23,051	5,832
Faculty and Staff TDY			45,273	15,393	25,013	5,867
Traveling Instructors*			21,392	---	---	21,392
Student TDY and Per Diem*			1,210,728	---	1,210,728	---
Student Research and Field Trips*			8,288	8,288	---	---
Civilian Graduate Education*			49,318	49,318	---	---
Data Automation and Services*			---	---	---	---
Rent and Other Equipment*			12,101	4,114	6,419	1,568
Printing and Reproduction*			10,887	3,702	5,774	1,411
Contract Education*			---	---	---	---
Purchased Maintenance and Equipment*			---	---	---	---
Miscellaneous Contract Services			25,220	8,575	13,377	3,268
Supplies and Material			47,994	16,318	25,456	6,220
Student PCS*			326,856	326,856	---	---
AFIT Direct Cost Total			4,947,921	1,517,117	2,977,670	453,134
Student Weeks (25;27)			21,964.28	7,467.72	11,649.04	2,847.52
Cost per Student Week				203.16	255.62	159.13
Indirect Costs (37):						
AFIT Indirect Costs:						
Commander*		3,368,931	202,136	68,726	107,213	26,197
Information Management		65,854	28,344	9,637	15,034	3,673
Supply		84,749	36,476	12,402	19,347	4,727
Controller		76,877	33,088	11,250	17,550	4,288

TABLE 41 (continued)

	Total Base Support	AFIT Total	School Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
				346	51,046	12,564
Data Automation*		512,580	220,614	86,172	134,442	—
CNRO		715,347	307,685	104,681	163,302	39,902
Communications		25,016	10,767	3,661	5,711	1,395
Graphics		109,331	47,056	15,999	24,959	6,098
Headquarters Staff		1,066,179	458,970	156,050	243,437	59,483
AFIT Overhead - FCS		45,753	19,692	6,695	10,445	2,552
Director of Administration		168,908	72,698	24,717	38,559	9,422
Academic Support		105,301	45,322	15,409	24,039	5,874
Minor Construction		176,840	76,112	25,878	40,370	9,864
Academic Library*		370,618	159,514	62,306	97,208	—
AFIT Indirect Cost Total		7,178,169	1,718,674	603,583	941,616	173,475
Student Weeks (35;27)			21,964.20	7,467.72	11,649.04	2,847.52
Cost per Student Week				80.81	80.81	60.92
		5 384		39.06%	60.94%	
Indirect Costs:						
Base Support Costs (37):						
Base Commander/Staff	917,866	49,381	21,254	8,302	12,952	
Staff Judge Advocate	451,431	24,287	10,453	4,083	6,370	
Chaplain	475,362	25,574	11,007	4,299	6,708	
Base Comptroller	3,409,396	183,426	78,947	30,837	48,110	
Transportation	6,423,667	345,593	148,743	54,099	90,644	
Security Police	2,617,606	140,827	60,612	23,675	36,937	
Safety	357,338	19,225	8,275	3,232	5,043	
Supply Admin	4,828,758	259,787	111,812	43,674	68,138	
Services	4,598,532	247,401	106,482	41,592	64,890	
Base Plant	146,884	7,902	3,401	1,328	2,073	
Disaster Preparedness	172,848	9,299	4,002	1,563	2,439	
Civil Engineering*	42,024,257	1,768,181	296,859	115,953	180,906	

TABLE 41 (continued)

	Total Base Support	AFIT Total	Extsn Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
Building Depreciation*		151,626	66,991	26,167	40,824	
Administrative Communication Costs	909,492	48,931	28,060	8,226	12,834	
Depreciation	1,875,779	100,917	43,435	16,966	26,469	
Medical Services	25,079,412	1,349,272	580,727	226,832	353,895	
Base Support Cost Total	94,288,626	4,733,629	1,507,069	614,828	959,232	
Student Weeks (25; 27)			21,964 28	7,467.72	11,649.04	2,847.52
Cost per Student Week				82.34	82.34	
				349	53.048	12.968
Indirect Costs:						
Command Overhead Costs (10; 11; 12)*:						
Air Force Overhead		52,673	7,711	2,622	4,090	999
Air Training Command Overhead		4,664,238	682,844	232,167	362,181	88,497
Air University Overhead		349,876	51,222	17,415	27,168	6,638
Command Overhead Cost Total		5,066,787	741,777	252,204	393,439	96,134
Student Weeks (25; 27)			21,964 28	7,467.72	11,649.04	2,847.52
Cost per Student Week				33.77	33.77	33.77
Other Costs (17)*:						
Student Military Pay and Allowances			8,558,517	2,909,843	4,539,120	1,109,554
Other Costs Total			8,558,517	2,909,843	4,539,120	1,109,554
Student Weeks (25; 27)			21,964.28	7,467.72	11,649.04	2,847.52
Cost per Student Week				389.66	389.66	389.66
Cost per Student Week Summary:						
AFIT Direct Costs				203.16	255.62	159.13

TABLE 41 (continued)

	Total Base Support	AFIT Total	School Total	Master of Science	Continuing Education Resident	Continuing Education Nonresident
AFIT Indirect Costs				80.83	80.83	60.92
Base Support Costs				82.34	82.34	---
Command Overhead Costs				33.77	33.77	33.77
Student Military Pay and Allowances				389.66	389.66	389.66
Unfunded Military Retirement and Civilian Retirement and Disability (40)				116.57	116.57	105.02
Total Cost Without Retirement				789.76	842.22	643.48
Total Cost With Retirement				906.33	958.79	748.50

TABLE 42

Analysis of Cost Differences Between Fiscal Years: School of Systems and Logistics - Master of Science Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 203.16	$ 198.49	$ 4.67
Indirect Costs:			
AFIT Indirect Costs	80.83	74.42	6.41
Base Support Costs	82.34	80.75	1.59
Command Overhead Costs	33.77	2.34	31.43[1]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[2]
Unfunded Retirement/Disability	116.57	115.12	1.45
Total Cost Without Unfunded Retirement/Disability	$ 789.76	$ 726.89	$ 62.87
Total Cost With Unfunded Retirement/Disability	$ 906.33	$ 842.01	$ 64.32

[1]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[2]Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 43

Analysis of Cost Differences Between Fiscal Years: School of Systems and Logistics - Continuing Education Resident Programs (Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 255.62	$ 283.24	$(27.62)[1]
Indirect Costs:			
AFIT Indirect Costs	80.83	74.42	6.41
Base Support Costs	82.34	80.75	1.59
Command Overhead Costs	33.77	2.34	31.43[2]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[3]
Unfunded Retirement/Disability	116.57	115.12	1.45
Total Cost Without Unfunded Retirement/Disability	$ 842.22	$ 811.64	$ 30.58
Total Cost With Unfunded Retirement/Disability	$ 958.79	$ 926.76	$ 32.03

[1]Decrease in direct costs due to increase in output (student weeks) without corresponding increase in faculty/staff.

[2]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[3]Increase in other costs due to pay raise impacting student pay and allowances.

TABLE 44

Analysis of Cost Differences Between Fiscal Years:
School of Systems and Logistics - Continuing
Education Nonresident Programs
(Costs per Student Week)

Cost Category	FY 78	FY 77	Difference
Direct Costs:	$ 159.13	$ 172.35	$(13.22)[1]
Indirect Costs:			
AFIT Indirect Costs	60.92	64.44	(3.52)
Base Support Costs	0	0	0
Command Overhead Costs	33.77	2.34	31.43[2]
Other Costs (Student Pay & Allow.)	389.66	370.89	18.77[3]
Unfunded Retirement/Disability	105.02	101.86	3.16
Total Cost Without Unfunded Retirement/Disability	$ 643.48	$ 610.02	$ 33.46
Total Cost With Unfunded Retirement/Disability	$ 748.50	$ 711.88	$ 36.62

[1]Decrease in direct costs due to increase in output (student weeks) without corresponding increase in faculty/staff.

[2]Increase in command overhead costs due to reorganization in FY 78 whereby AFIT and AU were realigned under ATC.

[3]Increase in other costs due to pay raise impacting student pay and allowances.

CHAPTER VIII

CONCLUSIONS AND RECOMMENDATIONS

Overview

The objective of this thesis was to develop a method of identifying, accumulating, and forecasting the costs of the various Air Force Institute of Technology Programs. Such a method was developed and actual fiscal year 1977 and 1978 data were used to employ the proposed AFIT cost model. In this chapter, a review of the results of this research are presented. In addition, recommendations for the application and further analysis of the model are detailed.

Conclusions

Most of the research objectives proposed in the opening chapter of this thesis were accomplished. The following is a review of those objectives that were met in the order that they were originally presented:

1. Objective 1, the identification of schools and programs to which costs were to be assigned, was met in Chapter II.

2. Specific cost objectives within the various schools and Civilian Institution Programs, Objective 2, were defined in Chapter III.

3. Objectives 3 and 4 were met in Chapter III when the elements of direct and indirect costs applicable to AFIT were defined.

4. Objective 5, the development of a method for allocating indirect costs to specific cost objectives, was also accomplished in Chapter III.

5. Objective 6, the identification of "other" costs, was also treated in Chapter III.

6. The final research objectives, 7 and 8, were met with the development of a cost matrix, and its subsequent employment using actual fiscal year 1977 and 1978 data in Chapters IV through VII.

Not all of the research objectives proposed in Chapter I were totally met. While an analysis of cost variances between fiscal years 1977 and 1978 showed that the costs were relatively stable between these consecutive years, the data were not sufficient to validate the cost model's forecast potential. A final determination regarding the quantification of the risk involved in using the AFIT cost model as a forecast tool will require additional fiscal years of data along with appropriate statistical analysis.

It is recognized that the use of the AFIT cost model in support of budgetary exercises or directed cost studies would not ordinarily be prudent prior to completion of the validation process. However, as mentioned in Chapter I, a

review of prior studies and cost analyses has shown a lack of documentation, particularly in the area of cost, which has prevented replication and precluded comparison of the cost results. Under these circumstances, it may be preferable to use the model developed in this thesis, even prior to complete validation, in the absence of an alternative.

With regard to the possible applications of the proposed AFIT cost model, the modular composition of the cost model gives it a high degree of utility. Depending upon the particular requirement of the person, office, or agency requesting information regarding AFIT, various cost components can be deleted if less than a full cost profile is needed. Additionally, student week cost data for AFIT Direct, AFIT Indirect, Base Support, Command Overhead, Student Pay and Allowances, and Military and Civilian Retirement cost categories facilitate cost comparisons between fiscal years. The areas where cost differences do occur are immediately apparent and can be reviewed in depth on an exception basis.

Recommendations

The pursuit of the research objectives of this thesis has led to a number of related questions that may prove to be worthwhile topics for further study. In addition to the previously mentioned need to validate the AFIT

cost model's forecasting capability, the following areas are recommended for further research:

1. The possibility of developing standard cost relationships that could be used to quickly arrive at costs per student week for selected cost categories should be explored. For example, a linear relationship may exist between AFIT Direct and Indirect costs, whereby it would be possible to estimate one, e.g., Indirect costs for Nonresident Civil Engineering Continuing Education, knowing the actual costs associated with the other (e.g., Direct costs for Nonresident Civil Engineering Continuing Education). Such a relationship could be determined through the use of such statistical techniques as linear regression.

2. The ability of the proposed AFIT cost model to forecast the costs associated with operating AFIT schools/program should be evaluated. Data relating to additional fiscal years will be required to perform the validation. The study should include the determination of the estimate reliability within prescribed confidence intervals.

3. In view of the Congressional recommendation that AFIT and the Naval Postgraduate School programs be costed in a comparable manner, it is recommended that the possibility of applying the cost structure outlined in this thesis to the Naval Postgraduate School be explored (21). It is recognized that a number of difficulties, especially in the area of indirect cost comparability between the two

institutions , will have to be surmounted. Examples of the kind of problems that are anticipated include the differences that exist between the Air Force and Navy accounting systems, and the fact that the Naval Postgraduate School is the host activity at the base it is located at while AFIT is a tenant.

4. In order to assess the cost effectiveness of AFIT sponsored degree programs, excluding Civilian Institutions, it is recommended that AFIT degree program costs be compared to the cost of similar privately offered programs. Captains Haynes and Williamson accomplished a comparison of the School of Systems and Logistics Masters of Science Degree program with the similar privately offered programs (15). A similar effort should be extended to the School of Engineering and Civil Engineering School programs.

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