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SEP 77 R R HAYNES, D A WILLIAMSON

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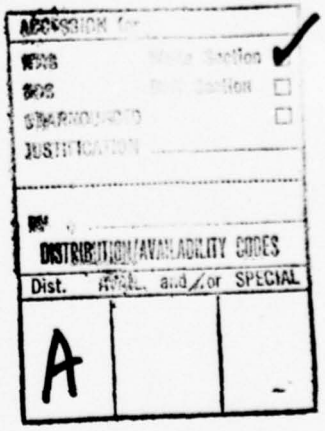
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The purpose of this thesis was to compare the full cost to the Air Force for providing an officer with a Master of Science degree in Logistics Management from AFIT with the full cost of a similar degree from a civilian institution. Graduate logistics programs of twelve universities were evaluated to determine if their graduate degree requirements were similar to AFIT resident program requirements; the requirements of four universities were found to be similar. Elements of cost necessary to make a comparative cost analysis were identified and defined. The elements were subdivided into three categories to facilitate cost comparison and to more readily identify the areas of greatest cost. The three categories were direct and indirect costs of education and pay and allowances. The average monetary value of each element of cost was determined. Then an analysis of the total cost of each program was performed. The authors concluded that pay and allowances are the most sensitive element of cost and that the AFIT resident program was the least expensive.

LSSR 16-77B

# A COST ANALYSIS OF GRADUATE EDUCATION IN LOGISTICS MANAGEMENT

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

Ralph R. Haynes, BS
Captain, USAF

Dennis A. Williamson, BS
Captain, USA

September 1977

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This thesis, written by

Captain Ralph R. Haynes

and

Captain Dennis A. Williamson

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degree of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT

DATE: 7 September 1977

Darrell N. Fulton
COMMITTEE CHAIRMAN

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TABLE OF CONTENTS


| | Page |
|---|---|
| ACKNOWLEDGMENTS | ii |
| LIST OF TABLES | viii |
| Chapter | |
| 1. INTRODUCTION | 1 |
| STATEMENT OF THE PROBLEM | 1 |
| REVIEW OF THE LITERATURE | 1 |
| History and Mission of AFIT | 1 |
| Value of Graduate Education | 3 |
| Logistics Management Education | 5 |
| Cost Studies | 9 |
| RESEARCH OBJECTIVE | 13 |
| RESEARCH QUESTION | 13 |
| 2. METHODOLOGY | 14 |
| INTRODUCTION | 14 |
| CIVILIAN INSTITUTION LOGISTICS MANAGEMENT DEGREE PROGRAMS | 15 |
| ELEMENTS OF COST | 17 |
| MONETARY COST DATA | 20 |
| FULL COST | 21 |
| SUMMARY LIST OF ASSUMPTIONS | 21 |
| SUMMARY LIST OF LIMITATIONS | 22 |

Chapter Page

3. COMPARISON OF AFIT RESIDENT AND CI MASTER'S DEGREE REQUIREMENTS. . . . . 23

OVERVIEW. . . . . 23

PRESENTATION OF DATA. . . . . 23

SIMILAR CI PROGRAMS . . . . . 25

George Washington University. . . . . 25

Indiana University. . . . . 27

Pennsylvania State University . . . . . 29

University of Houston . . . . . 32

DISSIMILAR CI PROGRAMS. . . . . 36

American University . . . . . 36

Ohio State University . . . . . 38

University of Maryland. . . . . 41

University of Miami . . . . . 43

University of Minnesota . . . . . 45

University of Oregon. . . . . 47

University of Southern California . . . 49

University of Tennessee . . . . . 51

DEFICIENCIES COMMON TO ALL TWELVE CI PROGRAMS . . . . . 53

4. ELEMENTS OF COST. . . . . 57

OVERVIEW. . . . . 57

DEVELOPMENT OF PERCENTAGES. . . . . 58

DIRECT COST OF EDUCATION. . . . . 58

Faculty . . . . . 65

Military Retirement--Faculty. . . . . 65

| Chapter | | Page |
|---|---|---|
| | Faculty and Staff Permanent Change of Station (PCS) | 67 |
| | Student PCS | 69 |
| | Temporary Duty (TDY) Travel and Per Diem | 69 |
| | Contract Tuition | 71 |
| | Data Automation | 71 |
| | Library | 75 |
| | Academic Support | 78 |
| | Depreciation of Buildings | 81 |
| | Printing | 81 |
| | INDIRECT COST OF EDUCATION | 83 |
| | Staff Judge Advocate | 84 |
| | Chaplain | 86 |
| | Base Comptroller | 86 |
| | Transportation | 86 |
| | Security Police | 87 |
| | Safety | 87 |
| | Supply Administration | 88 |
| | Base Administration | 88 |
| | Services | 88 |
| | Civil Engineering | 89 |
| | Communications/Electronics | 90 |
| | Command Overhead (USAF, AU, AFIT, LS) | 90 |
| | Personnel Administration | 90 |
| | Medical Services | 98 |

Chapter Page

PAY AND ALLOWANCES. . . . . 98

SUMMARY OF COSTS PER GRADUATE . . . . . 99

5. CONCLUSIONS AND RECOMMENDATIONS . . . . . 104

OVERVIEW. . . . . 104

CONCLUSIONS . . . . . 104

Direct Costs of Education . . . . . 105

Indirect Costs of Education . . . . . 106

Time Required for a Graduate Degree . . 107

Qualitative Factors . . . . . 108

RECOMMENDATIONS . . . . . 110

SELECTED BIBLIOGRAPHY . . . . . 111

A. REFERENCES CITED. . . . . 112

B. RELATED SOURCES . . . . . 117

AUTHOR BIOGRAPHICAL SKETCHES. . . . . 118

LIST OF TABLES


| Table | | Page |
|---|---|---|
| 1. | Average Logistics Graduate Curriculum. . . . | 7 |
| 2. | Universities Evaluated . . . . . | 24 |
| 3. | Requirements for a Master of Science in Logistics Management from the Air Force Institute of Technology. . . . . | 26 |
| 4. | Requirements for a Master of Business Administration Degree with Concentration in Transportation from The George Washington University. . . . . | 28 |
| 5. | Requirements for a Master of Business Administration Degree with Concentration in Operations and Systems Management from the Indiana University . . . . . | 30 |
| 6. | Requirements for a Master of Business Administration Degree with Concentration in Business Logistics from The Pennsylvania State University. . . . . | 31 |
| 7. | Requirements for a Master of Business Administration Degree with Concentration in Production-Logistics Management from the University of Houston. . . . . | 33 |
| 8. | Comparison of the AFIT Resident Program to Similar CI Programs. . . . . | 34 |
| 9. | Requirements for a Master of Business Degree with Concentration in Transportation from The American University. . . . . | 37 |
| 10. | Requirements for a Master of Business Administration Degree with Concentration in Transportation from The Ohio State University . . . . . | 39 |
| 11. | Requirements for a Master of Business Administration Degree with Concentration in Marketing-Logistics from the University of Maryland . . . . . | 42 |

| Table | | Page |
|---|---|---|
| 12. | Requirements for a Master of Science Degree in Management Science with Concentration in Logistics from the University of Miami. . . . | 44 |
| 13. | Requirements for a Master of Business Administration Degree with Concentration in Transportation and Business Logistics from the University of Minnesota . . . . . | 46 |
| 14. | Requirements for a Master of Science in Transportation and Logistics from the University of Oregon. . . . . | 48 |
| 15. | Requirements for a Master of Science Degree in Systems Management from the University of Southern California . . . . . | 50 |
| 16. | Requirements for a Master of Business Administration Degree with Concentration in Transportation and Logistics from the University of Tennessee . . . . . | 52 |
| 17. | Comparison of the AFIT Resident Program to Dissimilar CI Graduate Programs . . . . . | 55 |
| 18. | Development of Percentage Factors . . . . . | 59 |
| 19. | Method of Allocating Direct Cost of Education . | 62 |
| 20. | Method of Allocating Indirect Cost of Education | 63 |
| 21. | Allocation of AU & AFIT Command Overhead. . . . | 64 |
| 22. | LS Resident Program Faculty Cost. . . . . | 66 |
| 23. | Military Retirement . . . . . | 67 |
| 24. | Faculty and Staff PCS Costs . . . . . | 68 |
| 25. | Student PCS Costs (FY 1976) . . . . . | 69 |
| 26. | Student Temporary Duty Travel and Per Diem. . . | 70 |
| 27. | Contract Tuition Costs. . . . . | 72 |
| 28. | Data Automation Costs . . . . . | 76 |
| 29. | AFIT Branch Library Costs . . . . . | 79 |

| Table | | Page |
|---|---|---|
| 30. | Academic Support Costs. . . . . | 80 |
| 31. | Depreciation Expense of Building 288. . . . . | 82 |
| 32. | Printing Costs. . . . . | 83 |
| 33. | A Partial List of Service Organization Costs. . | 85 |
| 34. | Civil Engineering Services. . . . . | 89 |
| 35. | Communication/Electronics . . . . . | 91 |
| 36. | Command Overhead. . . . . | 92 |
| 37. | Personnel Administration. . . . . | 97 |
| 38. | Pay and Allowances Cost . . . . . | 100 |
| 39. | Summary of Costs per Graduate . . . . . | 103 |

# Chapter 1

# INTRODUCTION

## STATEMENT OF THE PROBLEM

Recently, there has been a divergence of opinion concerning the relative cost of a Master of Science degree in Logistics Management from the Air Force Institute of Technology (AFIT) resident program as compared to the cost of a similar degree from a civilian institution (CI). A need exists for an analysis of these costs.

## REVIEW OF THE LITERATURE

### History and Mission of AFIT

The Air Force Institute of Technology began with the development of the Army's Air School of Application, which was established in 1919 at McCook Field near Dayton, Ohio. In 1927, the school was redesignated the Air Corps Engineering School and relocated to Wright Field, Ohio. During World War II, the school was closed for three years, but was reopened in 1944 to satisfy emergency training requirements. The school was renamed the Army Air Force Institute of Technology in 1946 and was composed of the Engineering and Maintenance School and the Logistics and Procurement School (30:3).

In 1947, when Congress authorized establishment of the Air Force as a separate service within the Department of Defense, the Institute was transferred to the Air Force and renamed the Air Force Institute of Technology. Degree confirmation was authorized by the 83rd Congress in 1954. Later, AFIT was divided into three schools: Engineering, Logistics, and Business. When the School of Business was discontinued in 1960, the Civilian Institutions Directorate of AFIT was charged with the responsibility for providing business management education opportunity through civilian institutions. In 1963 the School of Logistics and the Civil Engineering Course were redesignated the School of Systems and Logistics and the Civil Engineering School, respectively. Based upon the content and depth of the graduate programs offered by the School of Engineering, the North Central Association of Colleges and Schools accredited AFIT as a master's degree-level institution in April 1960. The accreditation was extended to include the School of Systems and Logistics in March 1963 (30:3).

AFIT's 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 the United States Air Force and Department of Defense requirements [37:1].

Therefore, AFIT has a dual role in the education of Air Force personnel: to provide education in residence and to monitor and supervise students attending civilian institutions (30:2).

Value of Graduate Education

Recently, Lieutenant General John B. McPherson proposed that

> . . . the attaining of higher levels of professionalism and competence by individuals (through graduate education) leads to better managed organizations, improved performance, and the ability to accomplish more with fewer people. The natural result is more defense and security for the Nation and a lower defense budget [17:45].

He provided examples of benefits that are measurable in terms of savings and better management. However, General McPherson emphasized that many of the benefits derived from graduate education cannot be quantitatively measured and are, therefore, not included when evaluating the total benefits of graduate education. He noted that the graduate education program is of incalculable value in getting the most out of the defense dollar, but that the program is frequently the subject of criticism from Congressmen (17:45).

The General Accounting Office (GAO) reviewed the military services' graduate education programs in 1970. Justification for the review was based upon the increasing cost to the Department of Defense (DoD) for officer graduate education and training. In fiscal year 1969, a total of

4,200 officers were enrolled in full-time graduate education programs at a cost to the DoD in excess of 70 million dollars. The GAO found that

> . . . the criteria for identifying military officer positions requiring graduate level education and the use of those criteria are so broad and permissive that almost any officer position could be certified as requiring graduate level education [45:9].

As a result of their findings, the GAO recommended that Congress limit funds for fully-funded, full-time graduate education (45:9-11).

Because of continuing criticism from Congress, the military services reviewed their procedures for validating of positions requiring graduate level education and subsequently reduced the number of positions which require a graduate degree. The Air Force system for identifying and validating graduate degree positions is referred to as the Advanced Academic Degree Management System (AADMS). Julich and O'Connell (13) evaluated the AADMS and determined that it did not appear to be effective. However, based upon the results of their study, they concluded that the "Air Force needs officers with advanced degrees, and it needs a system to manage the determination of requirements and the use of valuable officer resources [13:68]."

Congressmen have shown continued concern over the cost of the DoD's education programs and have been increasingly critical of the services' graduate degree programs. At a time when the Air Force has an increasing need for

officers with graduate degrees due to advances in science and technology, it is faced with a dilemma because of budgetary reductions for advanced degrees (13:2).

Logistics Management Education

In 1976, 696 Air Force officers held a master's degree in Logistics Management code (1AMY) compared to the Air Force inventory objective for 972 holders of a master's degree in Logistics Management code (21:1). "Demand [by the Air Force] for logistics management education for support of military systems is . . . substantial [6:21]." However, logistics and the curriculum most desirable in a graduate logistics management education program are not well defined. In an effort to resolve these questions, the Society of Logistics Engineers (SOLE) defined logistics as

> . . . the art and science of management, engineering, and technical activities concerned with requirements, design, supplying and maintaining resources to support objectives, plans, and operations [19:18].

Using the SOLE definition, the National Education Committee (NEC) of SOLE revised their Logistics Education and Training Guide in 1976. The objective of the revision was to "provide a useful guide for the development of education material in the field of logistics [19:1]." The revision was based upon questionnaire responses from the deans of sixty-five colleges and universities who indicated that their schools were offering logistics courses. Nine of the deans indicated that they were offering graduate education courses in logistics

management at their universities. To develop a course curriculum outline for graduate education, the NEC grouped the courses offered by the universities into general classifications (Table 1). The outline is not a recommended curriculum based upon a study of the educational needs of logistics graduates, but is an average of the number of hours taught in a general area based upon the questionnaire responses from the nine deans. The significance of the outline is that it provides insight into what general areas of study are considered important to logistics graduate education. The outline indicates that current emphasis on graduate logistics management education is basically concerned with distribution, i.e. transportation and supply facets of logistics (19:1,18-20). It does not include instruction in the broader aspects of logistics as defined by the SOLE such as design, planning, procurement, and maintenance, nor does it include instruction in the unique aspects of military logistics.

Hale and Rooney (8) compared the managerial performance of officers who had earned a master's degree in Logistics Management from the AFIT School of Systems and Logistics (AFIT resident program) with the performance of officers who had earned a bachelor's degree only. A representative sample for each category of officer was identified and then each officer in the sample was evaluated by his immediate supervisor. The evaluation instrument

Table 1

Average Logistics Graduate Curriculum*

| Course Content | Average Graduate Hours |
|---|---|
| Business Logistics | 13 |
| Carrier Management | 4 |
| Logistics Analysis | 7 |
| Logistics System Management | 3 |
| Marketing | 5 |
| Materials Control | 7 |
| Operations Research | 3 |
| Physical Distribution | 16 |
| Production Planning/Management | 10 |
| Public Utility Management | 3 |
| Traffic Management | 3 |
| Transportation | 21 |
| Transportation & Logistics | 11 |
| Transportation Regulation | 12 |

*Results of a survey by the National Education Committee of the Society of Logistics Engineers (19:20).

consisted of forty questions, each of which described a dimension of managerial performance. Based upon the results of their study, Hale and Rooney concluded that the managerial performance of the resident program graduate officer was superior to the managerial performance of an officer without a graduate degree (8:13,70).

Chamberlin and Smith (5) compared the managerial performance of officers holding a master's degree in business from a civilian institution with the performance of officers holding a master's degree from the resident program and with the performance of officers without a graduate degree. The same evaluation instrument and techniques used by Hale and Rooney were used to determine the relative performance of CI graduate officers. The sample data from the Hale and Rooney thesis were used to define the performance of resident program graduate officers and of officers without a graduate degree. Based upon the results of their evaluation, Chamberlin and Smith concluded that the managerial performance of the resident program graduate officer was superior to the performance of the CI graduate officer. In addition, they concluded that the performance of the officer without a graduate degree significantly exceeded that of the CI graduate officer. They decided that CI graduate officers "may learn behavioral patterns and values that are not applicable to the military environment" and "that prolonged

absence from a military environment hinders an officer's ability to function in that environment [5:67]."

The qualitative conclusions of the two theses summarized above were not included in the cost portion of this analysis because, as McPherson noted, qualitative benefits do not lend themselves to measurement by quantitative methods. However, qualitative conclusions must be taken into consideration when making a comparative analysis of the overall benefits derived by the Air Force from the resident and CI graduate education programs.

Cost Studies

A review of the studies noted below to determine the cost of education indicated that a variety of cost categories and methodologies are used depending upon the reason for, emphasis of, or subjective conclusions of the personnel performing the study. A common oversight in these studies is the failure to clearly define who will incur the cost of education: the Air Force, the DoD, or the taxpayer. The objective of this thesis was to define the cost to the Air Force of graduate logistics management education. Therefore, only the costs incurred by the Air Force were considered.

A committee under the direction of the Commander, Air University (AU), conducted a study in 1972 to evaluate the cost and benefits of AFIT programs. The study provided

a comparative evaluation of the benefits of the resident and civilian institution programs. The committee concluded that resident programs at AFIT

> . . . are run more efficiently than civilian graduate schools and they cost the taxpayer less. When their (AFIT) programs are filled to capacity, the costs to the Air Force are virtually the same as the cost of obtaining comparable education from civilian institutions [41:57].

If the conclusion noted above were correct, the implication is that it would cost less to provide an officer with graduate education from a CI if the resident program is not filled to capacity, if resident costs were higher than indicated, or if CI costs were less than indicated. The cost data included in the study were AFIT overhead salaries (military and civilian), non-salary operation and maintenance costs, plant operation and maintenance costs, and student pay and allowances. In order to estimate the cost to the Air Force for pay and allowances, the committee assumed that the average student was a Captain, but did not provide data to validate the assumption. This assumption should have been validated because pay and allowances of the student vary depending upon rank and length of service for pay purposes. The committee excluded from the data Air University command overhead costs, real property investments, and base support costs for both resident and CI students (41:28-30,57). The study is the most complete cost evaluation available and is a source for developing elements of cost for the resident program.

In 1975, the GAO, as a result of Congressional interest, conducted a review of the efficiency of operation of the service academies. Costs were compiled to include the cost of operating each academy, student pay, and maintenance and operation expenditures for supplies, services, and equipment. The GAO concluded that "there are opportunities for cost reductions in the operations of the academies [46:ii]." The report provided additional insight into how the elements of cost can be categorized when evaluating the cost of education.

A 1976 report, "Report of Graduate Education Cost and Manning Methodology [42]," provided a "uniform breakdown of costs and manning for the fiscal year 1975 Graduate Education Program for submission to the Director, Defense Education [42:1]." In the report, an ad hoc committee subdivided the costs for graduate education at AFIT and at the Naval Postgraduate School (NPS) into three categories: education, non-education, and other.

> Education costs are those costs directly related to the education of the individual, i.e., faculty costs, academic support, library, etc. Non-Education costs are those costs not directly related to the education process, i.e., staff judge advocate, comptroller, civil engineering, etc. Other costs are student salaries, military family housing, and medical services. The latter costs are separately identified because they have the characteristic of being more directly related to the individual in his/her role as an officer in their respective Service [42:3].

In the opinion of the committee, delineation of the costs in this manner would facilitate a comparison of AFIT/NPS costs

with the cost of graduate education in the civilian community because the cost to the Air Force of civilian education can also be divided into these three categories. In addition, this is basically the same cost format as that used by the service academy comptroller to describe the cost of undergraduate education to the Air Force. However, the committee did not provide or evaluate the cost of civilian graduate education (42:3).

The Carnegie Commission on Higher Education concluded that data on the cost of civilian graduate education are poor. However, three-fourths of the graduate students in the arts and sciences are aided by governmental or institutional agencies (4:93). This aid in the past has represented the government's concern over manpower shortages in a particular area and an attempt to increase the percentage of a minority group in a given field. Federal assistance for graduate education has shown a continuing decline since 1974 because many fields are developing manpower surpluses (4:93-97). Therefore, when making a comparison between the cost to the taxpayer of civilian and military graduate education, it is important to consider what percentage of the cost of civilian graduate education is supported by government assistance.

Both the Department of Defense and AU have attempted to define the cost to the Air Force of resident and CI graduate education programs. However, no definitive, comparative

cost analysis has been performed on the resident and CI graduate education programs in Logistics Management. With the increasing cost of higher education and with continued reduction in funds available to the military services for graduate education, a cost analysis is needed to determine the cost to the Air Force of resident graduate education at AFIT and the cost of similar graduate education at a civilian institution. Additionally, such a study is necessary for adequate evaluation of alternative decision packages in a "zero-base" budgeting environment.

## RESEARCH OBJECTIVE

The objective of this research was to perform a comparative analysis of the cost to the Air Force of a Master of Science degree in Logistics Management from AFIT versus the cost of a similar degree from a civilian institution.

## RESEARCH QUESTION

What are the costs of a Master of Science degree in Logistics Management from AFIT and of a similar degree from a civilian institution?

# Chapter 2

# METHODOLOGY

## INTRODUCTION

The objective of this research was to perform a comparative analysis of the cost of a Master of Science degree in Logistics Management from the AFIT School of Systems and Logistics (AFIT resident program) and the cost of a similar degree from a civilian institution (CI). The methodology used to make the comparison was to:

a. Define master's degree programs in Logistics Management from civilian institutions that are similar to the Air Force needs for graduate logistics management education,

b. Determine what elements of cost should be included when evaluating the cost to the Air Force of graduate education,

c. Determine the monetary value which should be charged to each element of cost for each degree program,

d. Determine the full cost of the AFIT resident program and the full cost of similar degree programs from civilian institutions,

e. Compare the full cost of the AFIT resident program to the full cost of similar degree programs from civilian institutions.

## CIVILIAN INSTITUTION LOGISTICS MANAGEMENT DEGREE PROGRAMS

If the AFIT resident program were terminated, the Air Force would have to rely on civilian institutions for graduate level logistics education for its officers. The SOLE has identified nine universities that offer a logistics curriculum at the graduate level (19:16-20). In unpublished working papers (3), Captain R. J. Arceneaux, an AFIT graduate student, evaluated the degree requirements of several universities identified by the SOLE that offer a master's degree in Logistics Management to determine the comparability of their degree programs with the AFIT resident program in Logistics Management. In addition, Captain Gary F. Newton of the AFIT Civilian Institutions Directorate identified and evaluated the degree programs of several universities that offer a graduate degree in Logistics Management. In order to make a valid comparison of relative costs, it was necessary to identify those CI degree programs which were similar to the AFIT resident program.

One assumption in this comparison is that the resident program curriculum defines Air Force logistics

management education needs. The curriculum of the resident program is reviewed periodically by the Air University (AU) Board of Visitors, the AFIT Advisory Committee, and Air Force using agencies (3:5). These reviews by experts in education and in logistics support the validity of the assumption.

To identify CI programs that are similar to the resident program, the master's degree requirements of the universities identified by Captain Arceneaux and Captain Newton were compared with the AFIT resident program requirements for a Master of Science degree in Logistics Management. Information was obtained from school catalogs which were available, and comparisons were made upon the basis of course content and total credit hours required. In addition, an institution was considered similar if it required the same as or a greater number of graduate hours than the resident program and if the aggregate course content was similar to the content required by the resident program for a master's degree in Logistics Management. The AFIT School of Systems and Logistics offers a Master of Science degree in Facilities Management; a basic Master of Science degree in Logistics Management; and a Master of Science degree in Logistics Management with concentration in Procurement. This thesis was restricted to the basic Master of Science degree in Logistics Management because the objective of the thesis was to make a comparative cost analysis and not to

evaluate all possible program options. The course content was subdivided into the following categories: research/ administrative, functional, and quantitative management. This is the same course content subdivision used for the resident program. To facilitate the comparison, the same course content subdivision was used to analyze CI program requirements. In addition, this type of subdivision better reflected the differences, if any, in the programs. Master's degree requirements for each of the CI programs were extracted from a recently published catalog of the university being evaluated. The resident program Master of Science degree requirements were extracted from the 1976-1978 AFIT Catalog. Although the 1978 curriculum has changed from that listed in the catalog, the basic requirements have not changed. The universities that have program requirements similar to the resident program requirements are identified in Chapter 3 and were used in the analysis of costs.

## ELEMENTS OF COST

In order to make a valid comparison of the cost to the Air Force of a graduate degree from the resident program with the cost of a graduate degree from a CI program, the individual elements of cost for each program were identified. Then the elements of cost were evaluated to determine if they should be included in the full cost of a program. A partial list of the elements of cost were developed from the

following sources: "Report of a Study on AFIT Resident Programs and Costs" (41); "Report of Graduate Education Cost and Manning Methodology" (42); and "Formal Training Course Cost Report, RCS: HAF-ACM(AR)7108,FY75" (35). Each report was an effort to define the cost to the Air Force of graduate level education. Therefore, a list of the elements of cost developed from the reports includes both AFIT and CI unique as well as common elements of cost.

Each element of cost was evaluated to determine its relationship to the full program cost. Anthony and Herzlinger subdivided program cost into "direct costs plus an equitable share of indirect costs [2:25]." They define elements of direct cost as "those that are directly traceable to a single cost objective [2:25]." Indirect elements of cost are those that may be applicable to several programs, such as heating costs of a jointly used facility; therefore, each program is assigned an equitable share of the total amount of indirect cost. An equitable share of total indirect cost in this thesis was prorated to the resident program based upon population, output in student weeks, and square footage occupied. The following procedures were used: to determine an equitable share of indirect base support costs, the number of AFIT students, faculty, and staff was computed as a percentage of the total base population; to determine an equitable share of indirect AFIT support costs, the number of Systems and Logistics students, faculty, and staff was computed as

a percentage of the total AFIT population; to determine an equitable share of indirect Systems and Logistics support costs, the number of resident program students, faculty, and staff was computed as a percentage of the total Systems and Logistics population. The number of students was computed based upon the total average number of students per week in each program. A student week is the greatest common denominator between the output of the AFIT resident and continuing education programs.

Anthony and Herzlinger also noted that "in recording program costs, items of direct cost are identified separately from items of indirect cost [2:25]." Therefore, the first two categories of cost in this thesis are Direct and Indirect Cost of Education. In addition, a third category, Pay and Allowances, is used. This category relates only to the cost the Air Force assumes for student pay and allowances regardless of whether the individual is in the resident or a CI program. This method of categorization facilitated a better comparison of the resident to the CI programs because the comparable elements of cost for each can then be grouped and analyzed independently. An analysis by category can then be made to determine which category and elements of cost cause the greatest divergence between the resident and CI graduate programs. In addition, the real savings to the Air Force if the resident program were discontinued can be determined

based upon an analysis of direct and indirect costs of education.

## MONETARY COST DATA

The monetary data required to make the comparative cost analysis were collected from the fiscal year 1976 records of the AFIT Comptroller and the Accounting and Finance Office of the 2750th Air Base Wing, Wright-Patterson AFB, Ohio. These records include the "Responsibility Center (RC) Manager Monthly Report, 30 June 1976 [40]" and the "RC Manager Cost Center Report, 30 June 1976 [39]." Monetary factors for military pay and PCS moves were based upon actual fiscal year 1976 averages and statutory rates presented in the "Air Force Justification of Estimates for Fiscal Year 1978 [36]" which contains actual Fiscal Year 1976 rates. If the Civilian Institutions Directorate (CID) had a current contract with the specific CI being evaluated, then the monetary cost data for that institution were extracted from the CID records. When current contract data were not available, monetary costs were estimated based upon CID contracting procedures and the institution's costs as listed in a recently published catalog.

## FULL COST

The full costing approach was used in this thesis to determine the cost to the Air Force of graduate education in Logistics Management. The full cost of a program is "the sum of direct cost plus an equitable share of indirect cost [2:25]." In some previous cost studies and training reports (41; 42), the elements of cost were subdivided into direct, indirect, and other costs. In this thesis, the full cost of the resident program and the full cost of a similar CI degree program is the sum of the direct cost of education, a share of indirect cost of education, and pay and allowances.

This thesis presents a theory and framework upon which cost analysis and comparisons can be made. The monetary cost elements and, therefore, the full cost comparisons in this thesis represent costs for a single year. If the methodology were replicated and cost variations were considered, future cost predictions based upon the model presented herein can be made and will be accurate.

## SUMMARY LIST OF ASSUMPTIONS

The assumptions in this thesis are:

1. The resident program curriculum defines Air Force logistics management education needs.

2. CI programs in logistics management that are similar to Air Force needs for graduate level logistics education can be identified.

3. Elements of cost for each program can be identified.

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

## SUMMARY LIST OF LIMITATIONS

The limitations of this cost analysis are:

1. Degree requirements for the CI programs evaluated in this thesis were extracted from recently published university catalogs. Changes made in a specific CI program addressed in this thesis will require a reevaluation of the program in order to determine if it is similar to the AFIT resident program.

2. Universities identified in this thesis were extracted from previous studies because the prime objective of the thesis was to make a cost comparison, not to identify all the schools that have logistics related graduate programs.

3. Monetary cost values used in this analysis cannot be projected into the future without adjustment for future cost variations.

4. The methodology can only be applied to the resident program and CI graduate degree programs.

# Chapter 3

## COMPARISON OF AFIT RESIDENT AND CI MASTER'S DEGREE REQUIREMENTS

### OVERVIEW

Using the methodology presented in Chapter 2, the master's degree requirements of twelve universities (Table 2) were compared with the AFIT requirements for a Master of Science degree in Logistics Management (AFIT resident program). The results of that comparison are presented in this chapter.

### PRESENTATION OF DATA

The master's degree requirements of each university were extracted from a recent catalog from that university and are presented in Tables 3 through 17. In Tables 8 and 17, the AFIT resident program requirements for a Master of Science degree in Logistics Management are compared with the universities which have similar and dissimilar master's degree requirements, respectively. If a university's course requirement was similar to an AFIT resident program course requirement, the course hours were credited using the AFIT resident program course title (Tables 8 and 17). However, if the university's course requirement was not similar to

Table 2

Universities Evaluated

| Civilian Institution | Master's Degree Program |
|---|---|
| The American University | MBA[1] - Transportation |
| The George Washington University | MBA - Transportation |
| Indiana University | MBA - Operations and Systems Management |
| The Ohio State University | MBA - Transportation |
| The Pennsylvania State University | MBA - Business Logistics |
| University of Houston | MBA - Production/ Logistics |
| University of Maryland | MBA - Marketing/Logistics |
| University of Miami | MS[2] - Management Science/ Logistics |
| University of Minnesota | MBA - Transportation and Business Logistics |
| University of Oregon | MS - Transportation and Logistics |
| University of Southern California | MS - Systems Management |
| University of Tennessee | MBA - Transportation and Logistics |

[1]Master of Business Administration

[2]Master of Science

an AFIT resident program course requirement, the course hours were credited separately to the appropriate management subdivision using the university's course title. Elective course requirements, where offered, were selected in an attempt to design a master's degree program from the courses offered by the university as similar as possible to the AFIT resident program. Program managers in the Civilian Institutions Directorate (CID) of AFIT have the authority to specify program content for CI students. If the resident program were terminated, CID program managers would specify a similar program content for CI students.

## SIMILAR CI PROGRAMS

Of the twelve universities evaluated, four offered a master's degree program similar to the AFIT resident program (Table 3). The four universities were: George Washington University, Indiana University, Pennsylvania State University, and the University of Houston. Their master's degree requirements are evaluated below.

### George Washington University

George Washington University offers a Master of Business Administration (MBA) degree program with concentration in Transportation. The student is required to have a "common body of knowledge in business administration" prior to beginning the master's degree program. This

Table 3

Requirements for a Master of Science Degree in Logistics Management from the Air Force Institute of Technology (30:104-115)

| Course Requirement | Course Number | Quarter Hours Credit |
|---|---|---|
| Quantitative Management | | |
| Computer Programming | QM 3.13 | 3u[a] |
| Fundamentals of Quantitative Methods | QM 3.14 | 3u |
| Statistics | QM 5.22 & 5.32 | 8 |
| Systems Analysis | QM 5.33 & 5.43 | 5 [b] |
| Operations Research | QM 5.34 & 5.44 | 8 [b] |
| Total | | 6u/13 or 16[b] |
| Research/Administrative Management | | |
| Fundamentals of Accounting | RM 3.10 | 1u |
| Fundamentals of Technical Writing | RM 3.11 | 1u |
| Organization and Management - Structure | RM 5.20 | 4 |
| Microeconomic Analysis for Defense Programs | RM 5.21 | 4 |
| Organization and Management - Behavior | RM 5.30 | 4 |
| Concepts/Techniques of Research | RM 5.31 | 3 |
| Financial Mgmt. in the Federal Gov. | RM 5.42 | 3 |
| Thesis | RM 5.55 | 5 |
| Total | | 2u/23 |
| Functional Management | | |
| Procurement and Acquisition Management | FM 5.23 | 3 |
| Distribution Management | FM 5.40 | 3 |
| Maintenance and Production Management | FM 5.41 | 3 |
| Logistics Systems Policy | FM 5.50 | 3 |
| Total | | 12 |
| Electives Total | | 6 or 9[b] |
| Cumulative Total Hours Required | | 8u/57 |

[a]Prerequisite undergraduate requirements are identified by "u."

[b]Students may either take "Systems Analysis" and nine elective hours or "Operations Research" and six elective hours. Electives must be selected in a logistics related discipline.

requirement can be waivered for students who have had equivalent instruction in undergraduate business administration or by completing thirty semester (forty-five quarter) hours in "common body of knowledge courses" prior to starting the master's degree program. Minimum graduate course requirements for an MBA are: twelve semester hours of core courses; twelve semester hours of course work in a field of concentration; nine semester hours of electives and six semester hours of thesis work for a total of thirty-nine semester (fifty-eight and a half quarter) hours (Table 4). The course content and requirements are similar to the AFIT resident program (Table 8). Of the twelve universities evaluated, George Washington University comes closest to matching the AFIT resident program's emphasis on management in non-profit organizations (24:156-162).

Indiana University

Indiana University offers an MBA degree program with concentration in Operations and Systems Management. The program does not require prerequisite undergraduate courses. In addition, the student may be exempted from some of the first year's graduate course requirements if he has successfully completed similar undergraduate courses. Minimum graduate course requirements for an MBA are: thirty-seven semester hours of core courses and twelve semester hours of course work in a field of concentration for a total of forty-nine

Table 4

Requirements for a Master of Business Administration Degree with Concentration in Transportation from the George Washington University (24:156-162,214,266-269,378-383,450-453)

| Course Requirement | Course Number | Quarter Hours Credit[a] | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Mathematics for Management | Mgt 203 | 4.5u[b] | QM 3.14 |
| Introduction to Business and Economic Statistics | Stat 51 | 4.5u | QM 5.22 |
| Managerial Statistics I and II | Mgt 225/226 | 9.0 | QM 5.22/5.32 |
| Quantitative Factors in Administration | Mgt 204 | 4.5 | QM 5.33 |
| Total | | 9.0u/13.5 | |
| Research/Administrative Management | | | |
| Introductory Accounting | Acct 1/2 | 9.0u | RM 3.10 |
| Business Finance | BAd 131 | 4.5u | NA[c] |
| Basic Marketing Management | BAd 141 | 4.5u | NA |
| Commercial Law | BAd 161 | 4.5u | NA |
| Manufacturing Production | BAd 181 | 4.5u | RM 5.41 |
| Principles of Economics | Econ 1/2 | 9.0u | NA/RM 5.21 |
| Advanced Administrative Management | Mgt 201 | 4.5 | NA |
| Human Behavior in Organizations | Mgt 207 | 4.5 | RM 5.30 |
| Governmental Budgeting | Mgt 251 | 4.5 | RM 5.42 |
| Applied Microeconomics | Mgt 261 | 4.5 | RM 5.21 |
| Thesis Seminar | Mgt 299 | 4.5 | RM 5.31 |
| Thesis | Mgt 300 | 4.5 | RM 5.55 |
| Total | | 36u/27 | |
| Functional Management | | | |
| International Marketing | Mkt 248 | 4.5 | NA |
| Distribution Logistics | Mkt 253 | 4.5 | FM 5.40 |
| Procurement and Contracting | Mkt 280 | 4.5 | FM 5.23 |
| Business Policy Formulation | Mkt 297 | 4.5 | NA |
| Total | | 18 | |
| Total Hours Required for Degree | | 45u/58.5 | |

[a] Semester hours converted to quarter hours using a conversion factor of two semester hours equals three quarter hours (14).

[b] Prerequisite undergraduate requirements are identified by "u."

[c] The AFIT resident program offers no similar course.

semester (seventy-three and a half quarter) hours (Table 5). The course content and requirements are similar to the AFIT resident program (Table 8). The strength of the Indiana University program lies in the depth and comprehensive scope of the course requirements in the Research/Administrative Management area. Indiana University requires almost double the AFIT resident program requirements in this area. The cumulative content of the Indiana University requirements in the Research/Administrative Management area fulfill some of the course content requirements in the Functional Management area of the AFIT resident program (11:17-19).

Pennsylvania State University

Pennsylvania State University (Penn State) offers an MBA degree program with concentration in Business Logistics. The student is required to have "3 credits each in undergraduate accounting, statistics, and economics" prior to beginning the master's degree program. A minimum of forty-five semester (sixty-seven and a half quarter) hours of graduate core courses and a professional paper "comparable in quality and scope of work to a graduate thesis" are required to complete the master's degree program (Table 6). The course content and requirements are similar to the AFIT resident program (Table 8). In addition, Penn State has the unique characteristic that

> . . . the student body is divided into diverse sections of approximately forty students, with each

Table 5

Requirements for a Master of Business Administration Degree with Concentration in Operations and Systems Management from the Indiana University (11:17-19, 53-70)

| Course Requirement | Course Number | Quarter Hours Credit[a] | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Basic Concepts in Calculus and Probability | K501 | 3 | QM 3.14 |
| Basic Linear Programming | K504 | 1.5 | QM 3.14 |
| Computer Tools | K502 | 1.5 | QM 3.13 |
| Statistical Tools of Quantitative Analysis | K503 | 4.5 | QM 5.22 |
| Total | | 10.5 | |
| Research/Administrative Management | | | |
| Accounting Functions in Business | A501 | 4.5 | RM 3.10 |
| Managerial Economics | G502 | 4.5 | RM 5.21 |
| Management of Business Finance | F502 | 4.5 | NA[b] |
| Analysis of Business Conditions | G509 | 4.5 | NA |
| Legal Concepts and Trends Effecting Business | L506 | 4.5 | NA |
| Administrative Policy | J518 | 4.5 | NA |
| Marketing Management | M502 | 4.5 | NA |
| Operations Management | P502 | 4.5 | NA |
| Administration | W502 | 4.5 | NA |
| Organizational Behavior | Z502 or 503 | 4.5 | RM 5.30 |
| Total | | 45.0 | |
| Elective (4) | | 18[c] | |
| Total Hours Required for Degree | | 73.5 | |

[a]Semester hours converted to quarter hours using a conversion factor of two semester hours equal to three quarter hours.

[b]The AFIT resident program offers no similar course.

[c]Electives would be selected in the Operations and Systems Management/ Transportation related discipline.

Table 6

Requirements for a Master of Business Administration Degree with Concentration in Business Logistics from The Pennsylvania State University (27:116-122)

| Course Requirement[a] | Course Number | Quarter Hours Credit[b] | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Accelerated Business Statistics | QBA 398G | 4.5u[c] | QM 5.22 |
| Advanced Business Statistics | QBA 501 | 4.5 | QM 5.32 |
| Quantitative Analysis for Business Decisions | QBA 521 | 4.5 | QM 5.32 |
| Management Science: Implementation and Control | QBA 570 | 4.5 | QM 5.33 |
| Total | | 4.5u/13.5 | |
| Research/Administrative Management | | | |
| Microeconomic Analysis | Econ 502 | 4.5u | RM 5.21 |
| Accelerated Elementary Accounting | Acct 398G | 4.5u | RM 3.10 |
| Financial Management | Fin 531 | 4.5 | NA[d] |
| Complex Organizations: Structure and Design | Mgt 520 | 4.5 | RM 5.20 |
| Behavioral Science in Business | BA 550 | 4.5 | RM 5.30 |
| Business and Society | BA 555 | 4.5 | RM 5.30 |
| Marketing Management | Mkt 500 | 4.5 | NA |
| Business Research | BA 574 | 4.5 | RM 5.55 |
| Total | | 9.0u/27.0 | |
| Functional Management | | | |
| Logistics Systems Management | BLog 538 | 4.5 | FM 5.50 |
| Transportation Policy | BLog 540 | 4.5 | FM 5.40 |
| Seminar in Business Logistics | BLog 565 | 9 | NA |
| Operations Management | Mgt 510 | 4.5 | NA |
| Seminar in International Logistics | IB 504 | 4.5 | NA |
| Total | | 27.0 | |
| Total Hours Required for Degree | | 13.5u/67.5 | |

[a]Total undergraduate prerequisite hours required vary depending upon the student undergraduate curriculum.

[b]Semester hours have been converted to quarter hours using the conversion factor of two semester hours equals three quarter hours.

[c]Minimum prerequisite undergraduate hours are designated by "u."

[d]The AFIT resident program offers no similar course.

> section proceeding through the same core classes. Emphasis is placed on student interaction and shared learning both inside and outside the classroom [27:117].

This characteristic could be used to develop a class for Air Force officers which may preclude the loss of military proficiency of students who attend CI master's degree programs as noted by Chamberlin and Smith (page 7) (27:116-122).

University of Houston

The University of Houston offers an MBA degree program with concentration in Production/Logistics Management. The student is required to have completed seven semester (ten and a half quarter) hours in Computer Science and Quantitative Management Science prior to beginning the graduate program. A minimum of forty-eight semester (seventy-two quarter) hours of graduate courses are required for an MBA. The course requirements are: thirty-six semester hours of core courses and twelve hours of elective courses (Table 7). The course content and requirements are similar to the AFIT resident program (Table 8). The cumulative course content of the University of Houston program has the greatest similarity to the AFIT resident program of the twelve universities evaluated in this study (47:21-23).

Table 7

Requirements for a Master of Business Administration Degree with Concentration in Production-Logistics Management from the University of Houston (47:21-23,37-71)

| Course Requirement | Course Number | Quarter Hours Credit[a] | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Introductory Computer Science | CS 141 | 6u[b] | QM 3.13 |
| Quantitative Analysis for Decision Making | QMS 481 | 4.5u | QM 3.14 |
| Statistical Analysis | QMS 661/662 | 9.0 | QM 5.22/5.32 |
| Methodology of Quantitative Management Science | QMS 671 | 4.5 | QM 5.23/5.43 |
| Total | | 10.5u/13.5 | |
| Research/Administrative Management | | | |
| Organization Behavior and Management | OBM 632 | 4.5 | RM 5.30 |
| Cultural Social and Political Values | OBM 660 | 4.5 | RM 5.20 |
| Administrative Accounting | Acct 631 | 4.5 | NA[d] |
| Macroeconomic Analysis | Econ 691 | 4.5 | NA |
| Microeconomic Analysis | Econ 692 | 4.5 | RM 5.21 |
| Managerial Finance | Fin 635 | 4.5 | NA |
| Marketing Administration | Mkt 661 | 4.5 | NA |
| Organization Modeling | Mgt 633 | 4.5 | NA |
| Total | | 36.0 | |
| Functional Management | | | |
| Production and Logistics Management | PLMgt 631 | 4.5 | FM 5.41 |
| Total | | 4.5 | |
| Electives | | 18[c] | |
| Total Hours Required for Degree | | 10.5u/72 | |

[a]Semester hours converted to quarter hours using a conversion factor of two semester hours equals three quarter hours.

[b]Prerequisite undergraduate requirements are identified by "u."

[c]Electives would be selected in the Production-Logistics related discipline.

[d]The AFIT resident program offers no similar course.

Table 8

Comparison of the AFIT Resident Program to Similar CI Programs

| AFIT Course Number | Course Requirement | Universities | | | | |
|---|---|---|---|---|---|---|
| | | AFIT | G.W. | Indiana | Penn St. | Houston |
| | Quantitative Management | | | | | |
| QM 3.13 | Computer Programming | 3u[a] | | 1.5 | | 6u |
| QM 3.14 | Fundamentals of Quantitative Methods | 3u | 4.5u | 4.5 | 4.5u | 4.5u |
| QM 5.22/ 5.23 | Statistics | 8.0 | 4.5u/ 9.0 | 4.5 | 13.5 | 9.0 |
| QM 5.33/ 5.43 | Systems Analysis | 5[b] | 4.5 | | | 4.5 |
| QM 5.34/ 5.44 | Operations Research | 8 | | | | 4.5 |
| QM 6.30 | Simulation | 3[c] | | | | |
| | Total | 6u/ 13 or 16 | 9.0u/ 13.5 | 10.5 | 4.5u/ 13.5 | 10.5u/ 18 |
| | Research/Administrative Mgt. | | | | | |
| RM 3.10 | Fundamentals of Accounting | 1u | 9u | 4.5 | 4.5 | |
| RM 3.11 | Fundamentals of Technical Writing | 1u | | | | |
| RM 5.20 | Organization/ Management-Structure | 4 | | | 4.5 | 4.5 |
| RM 5.30 | Organization/ Management-Behavior | 4 | 4.5 | 4.5 | 9.0 | 4.5 |
| RM 5.21 | Microeconomic Analysis | 4 | 4.5u/ 4.5 | 4.5 | 4.5u | 4.5 |
| RM 5.31 | Concepts/Techniques of Research | 3 | 4.5 | 4.5 | | |
| RM 5.42 | Financial Management in Federal Government | 3 | 4.5 | | | |
| NA | Financial Management-Corporate | | 4.5u | 4.5 | 4.5 | 4.5 |
| NA | Business Society & Gov. | | | 4.5 | | |
| NA | Fundamentals of Management | | | | | |
| NA | Legal Concepts/Law | | 4.5u | 4.5 | | 4.5 |
| NA | Organization Management | | 4.5 | 4.5 | | 4.5 |
| NA | Marketing Management | | 4.5u | 4.5 | 4.5 | 4.5 |
| NA | Accounting-Administrative | | | | | 4.5 |
| NA | Macroeconomic Analysis | | 4.5u | | | |
| NA | Analysis of Bus. Conditions | | | 4.5 | | |
| NA | Industrial Relations | | | | | |
| RM 5.55 | Thesis/Professional Paper | 5 | 4.5 | | 4.5 | |
| | Total | 2u/ 23 | 31.5u/ 27.0 | 45.0 | 9.0u/ 27.0 | 36.0 |

Table 8 (Continued)

| AFIT Course Number | Course Requirement | Universities | | | | |
|---|---|---|---|---|---|---|
| | | AFIT | G.W. | Indiana | Penn St. | Houston |
| | Functional Management | | | | | |
| FM 5.23 | Procurement/Acquisition Management | 3 | 4.5 | | | |
| FM 5.40 | Distribution Management | 3 | 4.5 | 9.0 | 4.5 | 4.5 |
| FM 5.41 | Maint. & Prod. Management | 3 | 4.5u | | | 4.5 |
| FM 5.50 | Logistics Systems Policy | 3 | | 4.5 | 4.5 | 4.5 |
| FM 6.18 | Transportation Technology/ Policies | 3[c] | | | | |
| NA | Transportation Management | | | | | |
| FM 6.35 | International Logistics | 3[c] | | | 4.5 | 4.5 |
| NA | International Business Management | | 4.5 | 4.5 | | |
| NA | Business Logistics | | | | 9.0 | |
| NA | Operations Management | | | | 4.5 | |
| NA | Business Policy | | 4.5 | | | |
| FM 5.45 | Cost-Price Theory | 3[c] | | | | |
| | Total | 12 | 4.5u/ 18 | 18 | 27 | 18 |
| | Electives | 6 or 9[d] | | | | |
| | Total Hours Required for Degree | 8u/57 | 45u/ 58.5[d] | 73.5[d] | 13.5u/ 67.5[d] | 10.5u/ 72[d] |

[a]Prerequisite undergraduate requirements are identified by "u."

[b]Students may either take "Systems Analysis" and nine elective hours or "Operations Research" and six elective hours. Electives must be selected in a logistics related discipline.

[c]AFIT resident program elective course.

[d]Semester hours converted to quarter hours using a conversion factor of two semester hours equals three quarter hours.

## DISSIMILAR CI PROGRAMS

The master's degree programs of eight of the twelve universities evaluated were determined to be dissimilar to the AFIT resident program. The eight universities are identified below and their master's degree requirements evaluated.

### American University

The American University offers an MBA degree program with concentration in Transportation. "Undergraduate work in business subjects is not a prerequisite," but students with prior undergraduate work in business subjects may be waived from a graduate course without an examination (23:284). A minimum of forty-eight semester (seventy-two quarter) hours of graduate credit must be earned (Table 9). The course content and requirements are different from the AFIT resident program (Table 17). The American University's master's degree program does not require the depth of coverage in the Statistics and Systems Analysis area of Quantitative Management that is required by the AFIT resident program. In the Research Administrative Management area, the American University's program does not require a [redacted]s as does the AFIT resident program. The American University's program is limited to transportation and physical distribution in the Functional Management area. Cumulative course content in the other management areas does not correct this

Table 9

Requirements for a Master of Business Degree with Concentration in Transportation from The American University (23:284-302)

| Course Requirement[a] | Course Number | Quarter Hours Credit[b] | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Managerial Statistics | 10.606 | 4.5 | QM 5.22 |
| Quantitative Methods | 10.607 | 4.5 | QM 5.33 |
| Total | | 9.0 | |
| Research/Administrative Management | | | |
| Managerial Accounting | 10.603 | 4.5 | RM 3.10 |
| Business and Its Social Environment | 10.604 | 4.5 | RM 5.20 |
| Financial Management | 10.605 | 4.5 | NA[c] |
| Behavior in Complex Organizations | 10.608 | 4.5 | RM 5.30 |
| Human Behavior in Organizations | 10.609 | 4.5 | RM 5.30 |
| Business Economics | 10.612 | 4.5 | NA |
| Managerial Economics | 10.642 | 4.5 | RM 5.21 |
| Marketing Management | 11.601 | 4.5 | NA |
| Management of the Enterprise | 10.755 | 4.5 | NA |
| Total | | 40.5 | |
| Functional Management | | | |
| Principles and Problems of Transportation | 12.661 | 4.5 | NA |
| Transportation Policy Administration | 12.662 | 4.5 | FM 5.40 |
| Physical Distribution Management | 12.665 | 4.5 | FM 5.40 |
| Seminar in Transportation | 12.762 | 4.5 | NA |
| Total | | 18.0 | |
| Electives | | 4.5 | |
| Total Hours Required for Degree | | 72 | |

[a] No prerequisites are required.

[b] Semester hours converted to quarter hours using a conversion factor of two semester hours equals three quarter hours.

[c] The AFIT resident program offers no similar course.

deficiency. The AFIT resident program, in addition to transportation and physical distribution, requires course work in procurement, maintenance, and production in the Functional Management area in an attempt to examine all facets of logistics. The American University does not place emphasis on logistics in the non-profit organization as does the AFIT resident program. The cumulative effect of the dissimilar aspects of the two programs preclude the American University's MBA degree program being considered similar to the AFIT resident program (23:284-302).

Ohio State University

Ohio State University (OSU) offers an MBA degree program with concentration in transportation. The student is required to have forty-three quarter hours of undergraduate course work prior to completing the master's degree program. A minimum of forty-seven quarter hours of graduate credit must be earned for a master's degree (Table 10). The number of graduate course credit hours required by OSU is less than the number of graduate course credit hours required by the AFIT resident program. In addition, the course content and requirements are significantly different from the AFIT resident program (Table 17). The OSU master's degree program does not require the depth of coverage in the Quantitative Management area (Operations Research or Systems Analysis) that is required by the AFIT resident program.

Table 10

Requirements for a Master of Business Administration Degree with Concentration in Transportation from the Ohio State University (25:33-34; 26:18-19,78-80,116,140,145,299,416,463)

| Course Requirement | Course Number | Quarter Hours Credit | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Elementary Digital Computer Programming | CS 201 | 3u[a] | QM 3.13 |
| Mathematics for Business, Social, Biological Sciences I | Mth 121 | 5u | QM 3.14 |
| Statistics for Business, Social, Biological Sciences I | Stat 123 | 5u | QM 5.22 |
| Quantitative Methods in Business-Deterministic | BAd 801.01 | 3 | QM 5.22 or 5.32 |
| Quantitative Methods in Business-Stochastic | BAd 801.02 | 3 | QM 5.22 or 5.32 |
| Total | | 13u/6 | |
| Research/Administrative Management | | | |
| Introduction to Accounting | Acct 211 | 5u | RM 3.10 |
| General Psychology | Psy 100 | 5u | NA[b] |
| Legal Environment of Business | BAd 510 | 4u | NA |
| Corporate Finance | BAd 620 | 4u | NA |
| Principles of Economics | Econ 200 | 5u | NA |
| Principles of Management | BAd 500 | 3u | NA |
| Marketing | BAd 650 | 4u | NA |
| Advanced Marketing | BAd 850 | 3 | NA |
| Administration of Interpersonal Behavior | BAd 860 | 3 | RM 5.30 |
| General Business Conditions Analysis | Econ 843 | 3 | RM 5.21 |
| Business Controls | Acct 811 | 3 | NA |
| Managerial Economics | Econ 844 | 3 | NA |
| Formal Organization Theory | BAd 803 | 3 | RM 5.20 |
| Advanced Operations Management | BAd 830 | 3 | NA |
| Advanced Finance | BAd 820 | 3 | NA |
| Thesis | | 6 | RM 5.55 |
| Total | | 30u/30 | |

Table 10 (Continued)

| Course Requirement | Course Number | Quarter Hours Credit | Similar AFIT Course |
|---|---|---|---|
| Functional Management | | | |
| Business Policy | BAd 809 | 5 | NA |
| Total | | 5 | |
| Depth of Field Course | | 3[c] | |
| Breadth of Experience | | 3[c] | |
| Total Hours Required for Degree | | 43u/47 | |

[a]Prerequisite undergraduate requirements are identified by "u."

[b]The AFIT resident program offers no similar course.

[c]"Depth of Field Course" and "Breadth of Experience" would be selected from Transportation related discipline.

The OSU master's degree program concentrates on distribution, maintenance, and production in the Functional Management area, but does not include procurement as does the AFIT resident program. The OSU master's degree program does not evaluate the effect of logistics on the non-profit organization as does the AFIT resident program. The distinctive differences between the AFIT resident and OSU requirements for a master's degree preclude these two programs from being considered similar (25:33-34).

University of Maryland

The University of Maryland (UM) offers an MBA degree program with concentration in Marketing/Logistics. A student is required to have completed thirty semester (forty-five quarter) hours of undergraduate course credit prior to beginning the graduate program. A minimum of thirty semester (forty-five quarter) hours of graduate credit must be earned for an MBA (Table 11). The UM course content and requirements are different from the AFIT resident program requirements for a Master of Science Degree in Logistics Management (Table 17). The AFIT resident program requires a total of fifty-seven quarter graduate hours for a master's degree. The UM master's degree program requires only forty-five quarter hours. In the Quantitative Management area, the UM master's degree program does not require the depth of course work in Operations Research and Computer

Table 11

Requirements for a Master of Business Administration Degree with Concentration in Marketing-Logistics from the University of Maryland (49 ,40-48)

| Course Requirement | Course Number | Quarter Hours Credita | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Elementary Calculus | Mth 220 | 4.5u[b] | QM 3.14 |
| Statistical Analysis and Business Decisions | BSAD 730 | 4.5 | QM 5.32 |
| Business Statistics I | BSAD 230 | 4.5u | QM 5.22 |
| Introduction to Management Science | BSAD 734 | 4.5 | QM 5.34 |
| Total | | 9.0u/9.0 | |
| Research/Administrative Management | | | |
| Principles of Economics | Econ 201/203 | 9u | NA[c] |
| Principles of Accounting | BSAD 220/221 | 9u | RM 3.10 |
| Business Law | BSAD 380 | 4.5u | NA |
| Marketing | BSAD 350 | 4.5u | NA |
| Management and Organization Theory | BSAD 364 | 4.5u | RM 5.20 |
| Business Finance | BSAD 340 | 4.5u | NA |
| Behavioral Factors in Management | BSAD 764 | 4.5 | RM 5.30 |
| Application of Behavioral Science to Business | BSAD 765 | 4.5 | RM 5.30 |
| Total | | 36u/9.0 | |
| Functional Management | | | |
| Transportation Theory and Analysis | BSAD 770 | 4.5 | FM 6.18 |
| Management of Physical Distribution | BSAD 772 | 4.5 | FM 5.40 |
| Transportation Strategies | BSAD 773 | 4.5 | NA |
| Product, Production and Pricing Policies | BSAD 775 | 4.5 | FM 5.41 |
| Business Logistics | BSAD 872 | 4.5 | NA |
| Transportation Science | BSAD 873 | 4.5 | NA |
| Total | | 27 | |
| Total Hours Required for Degree | | 45u/45 | |

[a]Semester hours converted to quarter hours using a conversion factor of two semester hours equals three quarter hours.

[b]Prerequisite undergraduate requirements are designated by "u."

[c]The AFIT resident program offers no similar course.

Programming that is required for the AFIT resident program. A thesis is not required for the UM master's degree program as it is for the AFIT resident program. The UM master's degree program does not have the depth of coverage in graduate credit hours (9) that is required by the AFIT resident program (23) in the Research/Administrative Management area. In the Functional Management area, the UM master's degree program does not require graduate course credit hours in procurement or business logistics as does the AFIT resident program. The UM does not place emphasis on logistics in the non-profit organization as does the AFIT resident program. The cumulative differences in the two programs preclude the University of Maryland's MBA degree program being considered similar to the AFIT resident program (49:40-48).

University of Miami

The University of Miami offers a Master of Science (MS) degree program with concentration in logistics. The student is required to complete a minimum of eleven semester (sixteen and a half quarter) credit hours of prerequisite material prior to beginning the master's degree program. A minimum of thirty semester (forty-five quarter) hours of graduate credit must be earned (Table 12). The course content and requirements are different from the AFIT resident program requirements for a Master of Science degree in Logistics Management (Table 17). The University of Miami

Table 12

Requirements for a Master of Science Degree in Management Science with Concentration in Logistics from the University of Miami (50:84-90; 51:203,255)

| Course Requirement[a] | Course Number | Quarter Hours Credit[b] | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Introductory Calculus for the Social Sciences | Mth 104 | 4.5u[c] | QM 3.14 |
| Applied Business Statistics | Mth 301 | 4.5u | QM 5.22 |
| Finite Mathematics | Mth 103 | 4.5u | QM 3.14 |
| Introduction to Computer Programming | MAS 122 | 3.0u | QM 3.13 |
| Quantitative Foundation for Management Science | G 542 | 6 | QM 3.14/5.22 |
| Computer Simulation System | G 522 | 4.5 | QM 6.30 |
| Applied Operations Research | G 642 | 4.5 | QM 5.33 |
| Total | | 16.5u/15 | |
| Research/Administrative Management | | | |
| Design of the Experiment | | 4.5 | RM 5.31 |
| Thesis | | 9.0 | RM 5.55 |
| Total | | 13.5 | |
| Functional Management | | | |
| Elements of Logistics Systems | G 631 | 4.5 | FM 5.40 |
| Advanced Topics in Logistics | G 632 | 4.5 | NA[d] |
| Inventory Theory and Control | G 633 | 4.5 | QM 5.33 |
| Network Flow Theory | G 634 | 4.5 | QM 5.34 |
| Total | | 18.0 | |
| Total Hours Required for Degree | | 16.5u/46.5 | |

[a]Unspecified prerequisite courses are required depending upon the student's undergraduate exposure to "Management Science" related subjects.

[b]Semester hours converted to quarter hours using a conversion factor of two semester hours equals three quarter hours.

[c]Prerequisite undergraduate requirements are identified by "u."

[d]The AFIT resident program offers no similar course.

master's degree program requires a minimum of forty-five quarter hours compared to fifty-seven quarter hours required for the AFIT resident program. In the Research/Administrative Management area, the University of Miami master's degree program does not require course work in Organization/Management Behavior and Structure, Financial Management, or Microeconomics as does the AFIT resident program. The AFIT resident program requires course work in Procurement, Maintenance, and Production in the Functional Management area, but the University of Miami master's degree program does not. The University of Miami does not place emphasis on logistics in the non-profit organization in their master's degree program as does the AFIT resident program. Because of the major differences noted above, the University of Miami's Master of Science degree program is not considered similar to the AFIT resident program (51:84-90).

University of Minnesota

The University of Minnesota offers an MBA degree program with concentration in Transportation and Business Logistics. The student is required to complete approximately twenty-nine quarter hours of undergraduate basic business and "underlying discipline" courses prior to or concurrent with the MBA program. A minimum of forty-five quarter hours of graduate credit must be completed (Table 13). The course content and requirements are significantly different from

Table 13

Requirements for a Master of Business Administration Degree with Concentration in Transportation and Business Logistics from the University of Minnesota (52:96-107)

| Course Requirement | Course Number | Quarter Hours Credit | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Elementary Differential and Integral Calculus | Mth 1142 | 5u[a] | QM 3.14 |
| Statistics | Stat 1050 | 4u | QM 5.22 |
| Quantitative Approaches to Administrative Problems | OAM 8159 | 5 | QM 5.34 |
| Statistical Methods for Sample Surveys | QA 5171 | 4 | QM 5.32 |
| Total | | 9u/9 | |
| Research/Administrative Management | | | |
| Microeconomics | Econ 1004 | 4u | RM 5.21 |
| Macroeconomics | Econ 1005 | 4u | NA[b] |
| Business Economics | Econ 3005 | 4u | NA |
| Behavioral Science | Psy 3011 | 4u | NA |
| Organization and Management Behavior | Mgt 3002 | 4u | RM 5.30 |
| Foundations of Finance | BFin 8000 | 4 | NA |
| Accounting | Acct 8050 | 4 | RM 3.10 |
| Financial Management | BFin 8100 | 4 | NA |
| Government and Business Enterprise | Mgt 8008 | 4 | NA |
| Readings in Transportation and Business Logistics | Tran 8990 | 4 | RM 5.31 |
| Graduate Research in Transportation and Business Logistics | Tran 8995 | 4 | RM 5.55 |
| Total | | 20u/24 | |
| Functional Management | | | |
| Transportation and Business Logistics Topics | Tran 5134 | 4 | NA |
| Fundamentals of Transportation | Tran 8154 | 4 | NA |
| Business Logistics | Tran 8264 | 5 | FM 5.40 |
| Total | | 13 | |
| Total Hours Required for Degree | | 29u/46 | |

[a]Prerequisite undergraduate requirements are designated by "u."

[b]The AFIT resident program offers no similar course.

the AFIT resident program requirements for a Master of Science degree in Logistics Management (Table 17). The University of Minnesota master's degree program does not require the depth of coverage in the Quantitative Management area (Operations Research) that is required for the AFIT resident program. In the Functional Management area, Procurement, and Maintenance and Production are not required for the University of Minnesota master's degree program as they are for the AFIT resident program. The AFIT resident program places emphasis on logistics in the non-profit organization, but the University of Minnesota program does not. Because of these basic differences, the two master's degree programs are not considered to be similar (52:96-107).

University of Oregon

The University of Oregon (OU) offers a Master of Science degree program with concentration in Transportation and Logistics.

> The first year of the master's program includes a series of core courses required for students whose undergraduate studies have been in fields other than business administration. However, all or part of this requirement may be waived for students who have had equivalent instruction [53:229].

A minimum of forty-five quarter hours of graduate credits must be completed for a master's degree (Table 14). The course content and requirements are different from the AFIT resident program requirements for a Master of Science degree in Logistics Management (Table 17). The OU master's degree

Table 14

Requirements for a Master of Science in Transportation and Logistics from the University of Oregon (53:229-235)

| Course Requirement | Course Number | Quarter Hours Credit | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Elements of Calculus | Mth 106 | 4u[a] | QM 3.14 |
| Introduction to Numerical Computation | CS 133 | 4u | QM 3.14 |
| Statistics for Business Decisions | QM 511 | 3u | QM 5.22 |
| Operations Research Application | Mgt 520 | 3 | QM 5.34 |
| Operations Simulation | Mgt 530 | 3 | QM 6.30 |
| Applied Statistical Techniques | BA 522 | 3 | QM 5.32 |
| Analysis of Decisions under Uncertainty | QM 532 | 3 | QM 5.33 |
| Total | | 11u/12 | |
| Research/Administrative Management | | | |
| Intermediate Economic Analysis | Econ 375/376 | 6u | NA/RM 5.21 |
| Financial Environment | Fin 514 | 3u | NA[b] |
| Financial Management | Fin 516 | 3u | NA |
| Administration of Marketing Functions | Mkt 511 | 3u | NA |
| Management Analysis | Mgt 511 | 3u | NA |
| Accounting in Administration | Acct 511/512 | 6u | RM 3.10 |
| Legal Environment in Business | BE 517 | 3u | NA |
| Management and Behavioral Science | BA 521 | 3 | RM 5.30 |
| Decision Making in Management | BA 524 | 3 | NA |
| Human Resources Management | Mgt 534 | 3 | RM 5.30 |
| Theory of Business Organizations I | Mgt 541 | 3 | RM 5.20 |
| Research | Trn 501 | 3[c] | RM 5.55 |
| Thesis | Trn 503 | 6[c] | RM 5.55 |
| Total | | 27u/21 | |
| Functional Management | | | |
| Transportation Theory and Practice | Trn 549 | 3 | NA |
| Physical Distribution Management | Trn 550 | 3 | FM 5.40 |
| Transportation Policies | Trn 551 | 3 | FM 6.18 |
| International Business Operations | Mkt 573 | 3 | NA |
| Total | | 12 | |
| Total Hours Required for Degree | | 38u/45 | |

[a]Prerequisite undergraduate hours are designated by "u."

[b]The AFIT resident program offers no similar course.

[c]Credit hours are to be arranged between student and advisor.

program requires forty-five quarter hours of graduate credits compared with the AFIT resident program requirement for fifty-seven quarter hours of graduate credit. In the Functional Management area, the AFIT resident program requires graduate course credit in Procurement and Maintenance and Production, but the OU degree program does not. The OU program does not place emphasis on logistics in the non-profit organization as does the AFIT resident program. The AFIT resident and OU master's degree programs are not similar because of the basic differences noted above (53:229-235).

University of Southern California

The University of Southern California (USC) offers a Master of Science degree program in Systems Management. The student is required to complete approximately ten semester (fifteen quarter) hours of prerequisite course work prior to beginning or concurrent with the master's degree program. A minimum of thirty-six semester (fifty-four quarter) hours of graduate credit must be completed for a master's degree (Table 15). The course content and requirements are different from the AFIT resident program requirements for a Master of Science degree in Logistics Management (Table 17). The USC master's degree program requires only fifty-four quarter hours credit compared to fifty-seven quarter hours credit required for the AFIT resident

Table 15

Requirements for a Master of Science Degree in Systems Management from the University of Southern California (54:210-213)

| Course Requirement | Course Number | Quarter Hours Credit[a] | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Introductory College Mathematics | Mth 108 | 4.5u[b] | QM 3.14 |
| Deterministic Models in Decision Making | SSM 521 | 4.5 | QM 5.22 |
| Probablistic Models in Decision Making | SSM 525 | 4.5 | QM 5.33 |
| Systems Analysis | SSM 665 | 4.5 | QM 5.43 |
| Total | | 4.5u/13.5 | |
| Research/Administrative Management | | | |
| Management Theory and Practice | Mgt 489 | 6.0u | NA[c] |
| Psychological Factor in Systems Management | SSM 517 | 4.5 | RM 5.30 |
| Psychology | Psy 200 | 4.5u | NA |
| Man-Environmental Factors in Systems Management | SSM 523 | 4.5 | RM 5.30 |
| Fiscal Aspects of Systems Management | SSM 547 | 4.5 | NA |
| Systems Management and Organization | SSM 513 | 4.5 | RM 5.20 |
| Directed Research | SSM 590 | 4.5 | RM 5.31 |
| Thesis | SSM 594[ab] | 4.5 | RM 5.55 |
| Total | | 10.5u/27.0 | |
| Functional Management | | | |
| Man-Machine Factors in Systems Management | SSM 531 | 4.5 | FM 5.41 |
| Management of Logistics Systems | SSM 545 | 4.5 | FM 5.50 |
| Management Systems Controls and Surveys | SSM 543 | 4.5 | NA |
| Total | | 13.5 | |
| Total Hours Required for Degree | | 15.0u/54 | |

[a]Semester hours have been converted to quarter hours using the conversion factor two semester hours equals three quarter hours.

[b]Prerequisite undergraduate requirements are designated by "u."

[c]The AFIT resident program offers no similar course.

program. The USC master's degree program does not require courses in Procurement and Maintenance and Production in the Functional Management area as does the AFIT resident program. The USC master's degree program does not require courses in Financial Management in non-profit organizations as does the AFIT resident program. The AFIT resident program places greater emphasis on Computer Applications and Simulation than does the USC program. In addition, the USC program does not place emphasis on logistics in the non-profit organization as does the AFIT resident program. The AFIT resident and USC master's degree programs are not similar because of the differences stated above (54:210-213).

University of Tennessee

The University of Tennessee (UT) offers an MBA degree program with concentration in Transportation and Logistics. The student is required to complete twenty-eight quarter hours of prerequisite course work prior to or concurrent with the MBA program. However, part or all of the prerequisite requirements may be waivered depending upon the student's undergraduate course credits. A minimum of forty-five quarter hours of graduate credit must be completed for an MBA (Table 16). The course content and requirements differ significantly from the AFIT resident program requirements for a Master of Science degree in Logistics Management (Table 17). The UT master's degree

Table 16

Requirements for a Master of Business Administration Degree with Concentration in Transportation and Logistics from the University of Tennessee (1974-75)

| Course Requirement[a] | Course Number | Quarter Hours Credit | Similar AFIT Course |
|---|---|---|---|
| Quantitative Management | | | |
| Introductory Calculus-General Mathematics | Mth 1550 | 4u[b] | QM 3.14 |
| Computer Programming | Off Adm 5050 | 3u | QM 3.13 |
| Fundamental Concepts of Probability Theory | Stat 5311 | 3 | QM 5.22 |
| Statistical Methods | Stat 5312 | 3 | QM 5.32 |
| Total | | 7u/6 | |
| Research/Administrative Management | | | |
| Financial Accounting | Acc 5050/60 | 6u | RM 3.10 |
| Economic Analysis: Problems and Policies | Econ 5050/60 | 6u | NA[c] |
| Survey of Finance Functions of Business | Fin 5050 | 3u | NA |
| Survey of Marketing | Mkt 5050 | 3u | NA |
| Accounting for Control | Acc 5310 | 3 | NA |
| The Firm and Its Environment | Econ 5070/80 | 6 | RM 5.21 |
| Theory of Financial Management | Fin 5110 | 3 | NA |
| Human Problems in Administration | Ind Mgt 5230 | 3 | RM 5.30 |
| Marketing Management | Mkt 5200 | 3 | NA |
| Total | | 18u/18 | |
| Functional Management | | | |
| Production Management | Ind Mgt 5050 | 3u | FM 5.41 |
| Survey of Transportation and Logistics | Trn 5050 | 3 | FM 5.50 |
| Business Policy | BAd 5310 | 3 | NA |
| Business Logistics | Trn 5210 | 3 | FM 5.40 |
| Physical Distribution Strategy | Trn 5220 | 3 | FM 5.40 |
| International Marketing Management | Mkt 5450 | 3 | NA |
| Management and the Pricing Problem | Trn 5120 | 3 | FM 5.45 |
| Research in Transportation and Business Logistics | Trn 5990 | 3 | RM 5.31 |
| Total | | 3u/21 | |
| Total Hours Required for Degree | | 28u/45 | |

[a]Prerequisite undergraduate requirements depend upon the student's undergraduate curriculum.

[b]Prerequisite undergraduate requirements are designated by "u."

[c]The AFIT resident program offers no similar course.

program requires forty-five quarter hours of graduate credit, but the AFIT resident program requires fifty-seven quarter hours of graduate credit. In the Quantitative Management area, the UT master's degree program does not require Systems Analysis or Operations Research as does the AFIT resident program. UT does not require a Procurement course in the Functional Management area as does the AFIT resident program. The UT master's degree program does not require a thesis as does the AFIT resident program. The AFIT resident program places emphasis on logistics in the non-profit organization, but the UT program does not. Because of the differences noted above, the UT program is not similar to the AFIT Master of Science degree program in Logistics Management (55:34-35).

## DEFICIENCIES COMMON TO ALL TWELVE CI PROGRAMS

The master's degree programs of all twelve universities evaluated above differ from the AFIT Master of Science degree program in Logistics Management in two basic areas: a minimum of sixteen to twenty-four months are required to complete the CI master's degree programs versus twelve months to complete the AFIT resident program, and the CI master's degree programs do not place emphasis on logistics in the military environment as does the AFIT resident program. Providing the officer with a CI master's degree in a logistics related area may result in: additional costs

in terms of personnel, time, and money because more students will be in the education pipeline due to the extended program length; fewer officers with master's degrees because of the additional expense; a requirement for some additional on-the-job or integrative training to introduce the student to the unique aspects of logistics in the military environment; and some loss of military proficiency because the student is removed from the military environment for an extended length of time. The AFIT master's degree program is designed to specifically preclude the deficiencies which could be incurred by placing the military student in a CI master's degree program.

Table 17

Comparison of the AFIT Resident Program to Dissimilar CI Graduate Programs

| AFIT Course Number | Course Requirement | AFIT | Universities: Amer Univ | Ohio St | Maryland | Miami | Minn | Oregon | So. Cal | Tenn |
|---|---|---|---|---|---|---|---|---|---|---|
| | Quantitative Management | | | | | | | | | |
| QM 3.13 | Computer Programming | 3u[a] | | 3u | | 3.0u | | | | 3u |
| QM 3.14 | Fundamentals of Quantitative Methods | 3u | | 5u | 4.5u | 9.0u | 5u | 8u | 4.5u | 4u |
| QM 5.22/ 5.32 | Statistics | 8.0 | 4.5 | 5u/6 | 4.5u/ 4.5 | 4.5u 6 | 4u/4 | 3u/3 | 4.5 | 6 |
| QM 5.33/ 5.43 | Systems Analysis | 5.0[b] | 4.5 | | | 4.5 | | 3 | 9.0 | |
| QM 5.34/ 5.44 | Operations Research | 8.0[b] | | | 4.5 | 9.0 | 5 | 3 | | |
| QM 6.30 | Simulation | 3[c] | | | | 4.5 | | 3 | | |
| | Total | 6u 13 or 16 | 9.0 | 13u/ 6 | 9.0u/ 9.0 | 16.5u/ 24 | 9.0u /9.0 | 11u/ 12.0 | 4.5u/ 13.5 | 7u/ 6 |
| | Research/Administrative Mgt. | | | | | | | | | |
| RM 3.10 | Fundamentals of Accounting | 1u | 4.5 | 5u | 9u | | 4 | 6u | | 6u |
| RM 3.11 | Fundamentals of Technical Writing | 1u | | | | | | | | |
| RM 5.20 | Organization/ Management-Structure | 4 | 4.5 | 3 | 4.5u | | | 3.0 | 4.5 | |
| RM 5.30 | Organization/ Management-Behavior | 4 | .0 | 3 | 9.0 | | 4u | 6.0 | 9.0 | 3 |
| RM 5.21 | Microeconomic Analysis | 4 | 4.5 | 3 | | | 4u | 3u | | 6 |
| RM 5.31 | Concepts/Techniques of Research | 3 | | | | 4.5 | 4 | | 4.5 | 3 |
| RM 5.42 | Financial Mgt. in Federal Government | 3 | | | | | | | | |
| NA | Financial Management-Corporate | | 4.5 | 4u/6 | 4.5u | | 8 | 6u | 4.5 | 3u/3 |
| NA | Business Society & Government | | | | | | 4 | | | |
| NA | Fundamentals of Management | | | 3u | | | | 3u | | |
| NA | Legal Concepts/Law | | | 4u | 4.5u | | | 3u | | |
| NA | Organization Management | | | 3 | | | | | 6.0u | |
| NA | Marketing Management | | 4.5 | 4u/3 | 4.5u | | | 3u | | 3u/3 |
| NA | Accounting-Administrative | | | | | | | | | 3 |
| NA | Macroeconomic Analysis | | 4.5 | 5u/3 | 9u | | 8u | 3u | | 6u |

Table 17 (Continued)

| AFIT Course Number | Course Requirement | AFIT | Universities: Amer Univ | Ohio St | Mary-land | Miami | Minn | Ore-gon | So. Cal | Tenn |
|---|---|---|---|---|---|---|---|---|---|---|
| NA | Analysis of Business Conditions | | | | | | | 3 | | |
| NA | Industrial Relations | | | | | | | | | |
| RM 5.55 | Thesis/Professional Paper | 5 | | 6 | | 9.0 | 4 | 9.0 | 4.5 | |
| NA | Management of the Enterprise | | 4.5 | | | | | | | |
| NA | General Psychology | | | 5u | | | 4u | | 4.5u | |
| | Total | 2u/ 23 | 40.5 | 30u/ 30 | 36u/ 9.0 | 13.5 | 20u/ 24 | 27u/ 21 | 10.5u /27.0 | 18u/ 21 |
| | Functional Management | | | | | | | | | |
| FM 5.23 | Procurement/Acquisition Management | 3 | | | | | | | | |
| FM 5.40 | Distribution Management | 3 | 9.0 | 3 | 4.5 | 4.5 | 5 | 3 | | 6 |
| FM 5.41 | Maintenance & Production Management | 3 | | 3 | 4.5 | | | | 4.5 | 3u |
| FM 5.50 | Logistics Systems Policy | 3 | | | | | | | 4.5 | 3 |
| FM 6.18 | Trans. Technology/ Policies | 3[c] | | | 4.5 | | | 3 | | |
| NA | Transportation Management | | 4.5 | | 9.0 | | 4 | 3 | | |
| FM 6.35 | International Logistics | 3[c] | | | | | | | | |
| NA | International Business Mgt. | | | | | | | 3 | | 3 |
| NA | Business Logistics | | | 5 | 4.5 | 4.5 | 4 | | | |
| NA | Operations Management | | | | | | | | | |
| NA | Mgt. Systems Controls & Surveys | | | | | | | | 4.5 | 3 |
| FM 5.45 | Cost-Price Theory | 3[c] | | | | | | | | 3 |
| NA | Seminar in Transportation | | 4.5 | | | | | | | |
| | Total | | 18.0 | 11.0 | 27.0 | 9.0 | 13 | 12 | 13.5 | 3u/ 18 |
| | Electives | 6 or 9[b] | 4.5 | | | | | | | |
| Total Hours Required for Degree | | 8u/ 7 | 72[d] | 43u/ 47 | 45u/ 45[d] | 16.5u/ 46.5[d] | 29u/ 46 | 38u/ 45 | 15u/ 54[d] | 28u/ 45 |

[a] Prerequisite undergraduate hours are designated by "u."

[b] Students may either take "Systems Analysis" and nine elective hours or "Operations Research" and six elective hours. Electives must be selected in a logistics related discipline.

[c] An elective course in the AFIT resident program.

[d] Semester hours converted to quarter hours using the conversion factor of two semester hours equal three quarter hours.

# Chapter 4

# ELEMENTS OF COST

## OVERVIEW

This chapter identifies and defines each element needed to make a cost comparison between the AFIT Master of Science degree program in Logistics Management (AFIT resident program) and similar civilian institution (CI) master's degree programs. The data and methodology used to develop a monetary value for each element of cost is presented and an average cost per graduate based upon Fiscal Year 1976 (FY76) data for each element is determined. The elements of cost are subdivided into three major categories--Direct Cost of Education, Indirect Cost of Education, and Pay and Allowances. Rationale for including each element of cost in the full cost is presented. If an element of cost is excluded from the full cost to the Air Force (USAF), the rationale for its exclusion is presented. Each element of cost is evaluated to determine if it should be assigned as an element of the full cost of the AFIT resident program, a CI program, or both the AFIT resident and CI programs. Then the full cost per graduate for both the resident and CI program is determined and a cost comparison is made.

## DEVELOPMENT OF PERCENTAGES

In order to prorate an average share of cost per graduate, percentage factors which represent a portion of the total cost of a specific element of cost for both the AFIT resident program and the AFIT Civilian Institutions Directorate (CID) program must be determined. Percentage factors for the CID program must be developed because all civilian institution graduate degree programs would be administered by CID if the AFIT resident program were terminated. The percentage factors used in this thesis to prorate an equitable share of cost to both programs are developed based upon FY76 data and presented in Table 18. Organizational relationships are presented in Tables 19 through 21.

## DIRECT COST OF EDUCATION

Direct costs of education are incurred by the Air Force as the exclusive result of providing an officer with a master's degree from either the resident or a CI program. "Costs incurred solely by the Air Force" are defined in this thesis as expenditures of funds that are planned, programmed, and budgeted by the Air Force for a single cost objective (the resident program or a CID program). The cost of achieving the single cost objective is not shared by the Air Force with any other organization.

Table 18

Development of Percentage Factors

| | | |
|---|---|---|
| 1. | AFIT personnel as a percentage of total Wright-Patterson AFB population in FY 76: | |
| | a. WPAFB civilian and military population excluding dependents (31:24): | 23,952 |
| | b. AFIT civilian and military (staff, faculty, and students) population excluding dependents (31:11,24): | 937 |
| | c. Percentage: | .039 (3.9%) |
| 2. | School of Systems and Logistics (LS) personnel as a percentage of the total AFIT population: | |
| | a. LS civilian and military population (staff, faculty, students) excluding dependents (32; 44): | 298 |
| | b. Percentage: | .318 (31.8%) |
| 3. | LS graduate resident program output as a percentage of total LS output: | |
| | a. LS graduate resident program output in student weeks [165.83 man-years X 52 weeks] (29:4): | 8,623 |
| | b. LS continuing education program output in student weeks [67,660 man-days ÷ 7] (28:19): | 9,666 |
| | c. Total LS output in student weeks: | 18,289 |
| | d. Percentage: | .471 (47.1%) |

Table 18 (Continued)

4. AFIT resident program Master of Science degree in Logistics Management (basic degree program) as a percentage of the total resident program output:

   a. Basic degree program output in student weeks [119.76 man-years X 52 weeks] (29:4): 6,228

   b. Total LS resident program student weeks (from 3a above): 8,623

   c. Percentage: .722 (72.2%)

5. CID program output as a percentage of total AFIT output:

   a. Total AFIT output in student weeks:

      1) Resident programs [467.35 man-years X 52 weeks] (29:1): 24,302

      2) CID programs [3465.93 man-years X 52 weeks] (29:5): 180,228

      3) AFIT Continuing Education programs [141,947 man-days ÷ 7] (28:1): 20,278

   b. Total AFIT output: 224,808

   c. Percentage: .802 (80.2%)

6. LS resident program output as a percentage of total AFIT output:

   a. LS resident program output in student weeks [165.83 man-years X 52 weeks] (29:4): 8,623

   b. Total AFIT output (from 5b above): 224,808

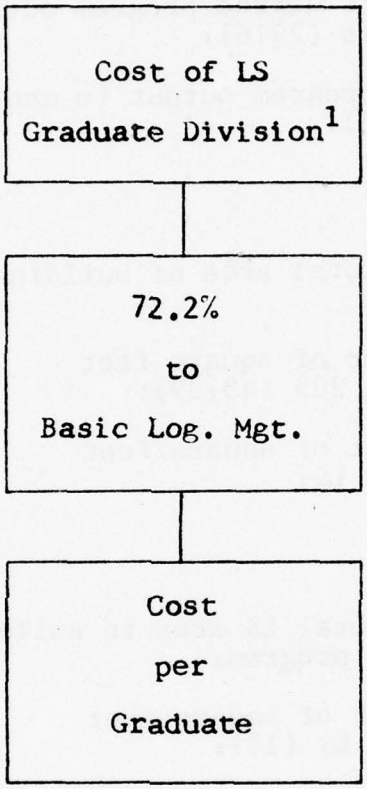
   c. Percentage: .038 (3.8%)

Table 18 (Continued)

| | | |
|---|---|---|
| 7. | CID Master's degree program output as a percentage of total CID program output: | |
| | a. CID Master's degree program output in man-years (29:6): | 441.5 |
| | b. Total CID program output in man-years (29:5): | 3,465.9 |
| | c. Percentage: | .127 (12.7%) |
| 8. | Percentage of total area of Building 288 occupied by LS: | |
| | a. Total number of square feet in Building 288 (43:39): | 153,030 |
| | b. Total number of square feet occupied by LS: | 93,378 |
| | c. Percentage: | (.61) 61% |
| 9. | Percentage of total LS area in Building 288 occupied by the resident program: | |
| | a. Total number of square feet occupied by LS (15): | 93,378 |
| | b. Total number of square feet occupied by the resident program (18): | 37,350 |
| | c. Percentage: | .40 (40%) |

Table 19

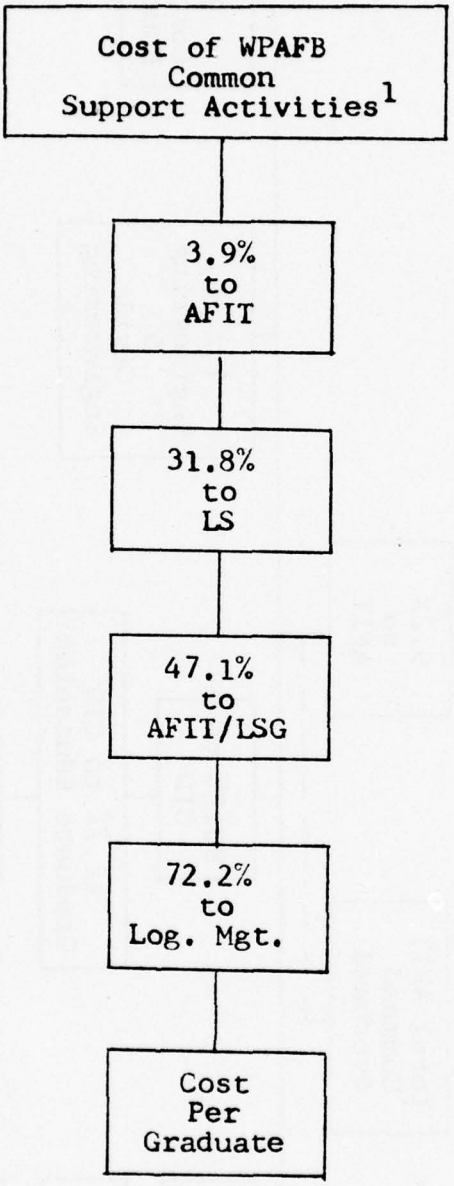
Method of Allocating Direct Cost of Education




[1]The following elements of direct cost are prorated using this procedure: Faculty, Faculty PCS, Academic Support (except thesis and textbook allowance), Student TDY Travel and Per Diem, and Military Retirement--Faculty.

Table 20

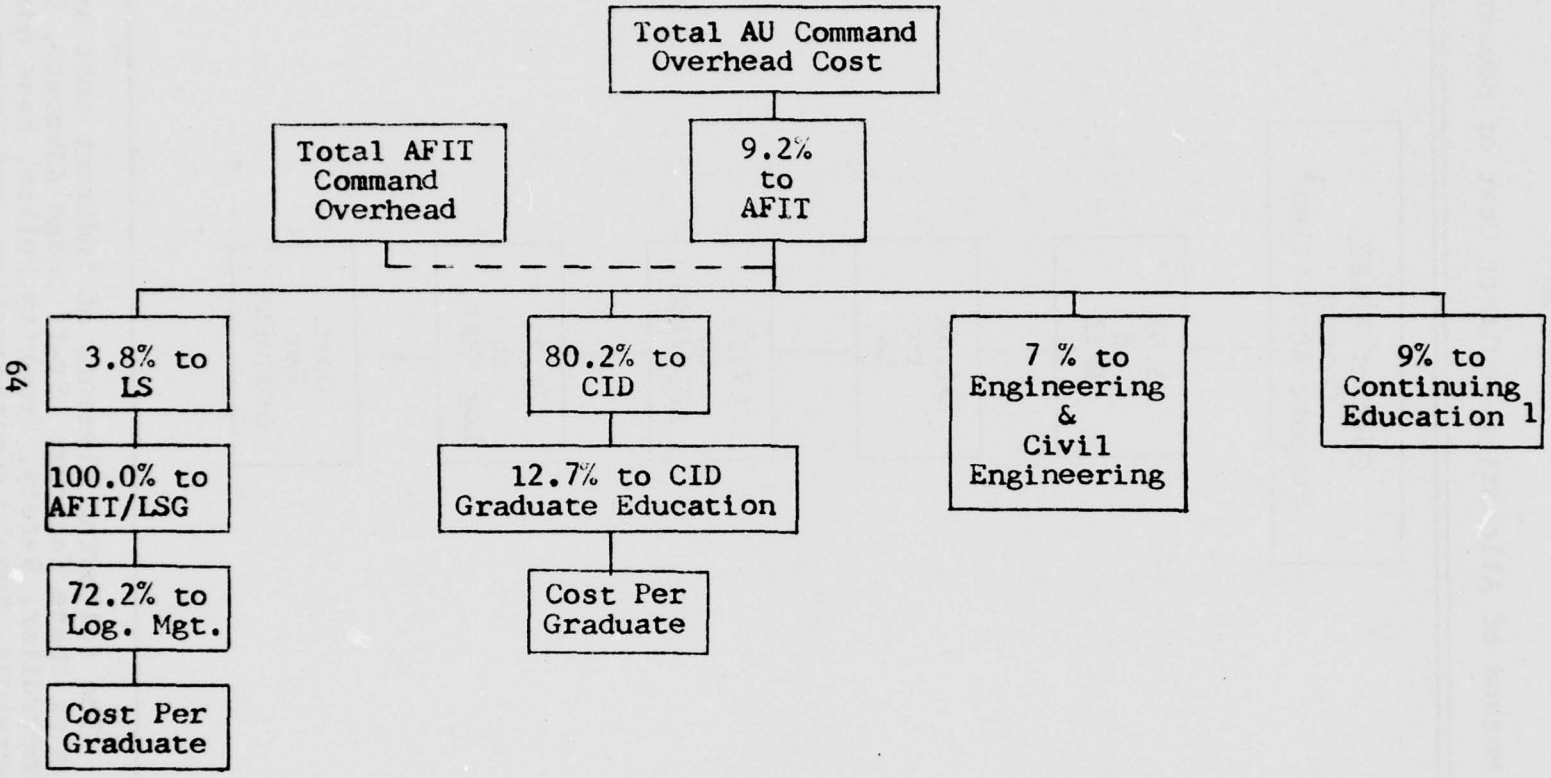
Method of Allocating Indirect Cost of Education




[1]The following elements of indirect cost are prorated using these factors: Staff Judge Advocate, Chaplain, Base Comptroller, Safety, Security Police, Base Administration, Services, Supply Administration, and Transportation.

Table 21

Allocation of AU & AFIT Command Overhead




[1]All AFIT Continuing Education.

Faculty

This element of cost includes average pay and allowances, symposia associated registration fees, and temporary duty (TDY) travel and per diem of all military and civilian personnel whose principal duty is instructing in the AFIT resident program. For this analysis, the department chairmen are considered full time instructors. This element of cost is included in the direct cost of education because instructors are an integral part of the AFIT resident program. The element of cost is applicable to the resident program, but not the CID program. The average cost per basic degree program graduate was $3,595.00. Computations for this element of cost are presented in Table 22.

Military Retirement--Faculty

This element of cost is incurred by the Air Force for retirement benefits for the faculty of the resident program.

> Although retirement benefits may not be paid for many years in the future, the costs are incurred because of the time that the employee currently works and are properly an expense of current operations [2:124].

Average cost per basic degree program graduate was $498.00. Computations are presented in Table 23.

Table 22

LS Resident Program Faculty Cost

1. Monetary Values:

   a. Pay and Allowances (36:15,22,26; 38:1)

| Rank | Number Assigned (16) | Total Months Assigned (16) | Average Pay Per Month Per Individual | Total |
|---|---|---|---|---|
| Lt Col | 11 | 108.5 | $2,179 | $236,422 |
| Major | 10 | 95 | 1,809 | 171,855 |
| Captain | 7 | 71 | 1,513 | 107,423 |
| GS-14 | 2 | 24 | 2,649 | 63,576 |
| GS-13 | 1 | 12 | 2,036 | 24,432 |
| GS-12 | 1 | 12 | 1,777 | 21,324 |
| Total | | | | $625,032 |

| | |
|---|---|
| b. Temporary Duty Travel and Per Diem (39:786) | 3,417 |
| c. Symposia Associated Registration (39:782,785,786) | 3,984 |
| 2. Total LS Resident Program Faculty Cost | $632,433 |
| 3. Percentage of total cost allocated to the basic degree program (Table 18) | .722 |
| 4. Faculty cost assigned to the basic degree program | $456,616 |
| 5. Number of graduates in the basic degree program in Fiscal Year 1976 (29:4) | 127 |
| 6. Average cost per basic degree program graduate | $3,595 |

Table 23

Military Retirement

| | | |
|---|---|---|
| 1. | Total military faculty pay (36:15,22,26) | $515,698 |
| 2. | Unfunded military retirement percentage rate (42:4) | .17 |
| 3. | Total cost of unfunded military retirement pay | $ 87,669 |
| 4. | Percentage of total cost allocated to the basic degree program (Table 18) | .722 |
| 5. | Unfunded military retirement pay cost assigned to basic degree program | $ 63,297 |
| 6. | Number of graduates in basic degree program in Fiscal Year 1976 | 127 |
| 7. | Average cost per basic degree program graduate | $ 498 |

Faculty and Staff Permanent Change of Station (PCS)

This element of cost includes travel cost, movement of household goods and dislocation allowances of military and civilian faculty personnel and their dependents. Although the costs of PCS moves are budgeted and paid from a central fund, in this thesis it will be assumed that AFIT incurs the cost of the move from the previous duty station to Wright-Patterson AFB, Ohio (WPAFB). PCS costs are included in the direct cost of education because they are an expense that is incurred in order to get the instructor

to AFIT to perform his primary duty. This element of cost is applicable to the resident program, but not the CI program. Average cost per basic degree graduate was $98.00. Computations for this element of cost are presented in Table 24.

Table 24

Faculty and Staff PCS Costs

| | | |
|---|---|---|
| 1. | Actual officer PCS Operational Travel Costs (36:83) | $32,969,000 |
| 2. | Number of officer PCS Operational moves (36:83) | 13,348 |
| 3. | Average cost of an officer PCS Operational move | $2,470 |
| 4. | Number of LS resident program faculty PCS Operational moves (16) | 7 |
| 5. | Average total cost for LS resident program PCS Operational moves | $17,290 |
| 6. | Percentage of average total cost allocated to the basic degree program | .722 |
| 7. | Faculty PCS costs assigned to the basic degree program | $12,483 |
| 8. | Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| 9. | Average cost per basic degree program graduate | $98 |

Student PCS

This element of cost is defined and meets the same criteria as Faculty and Staff PCS except that Student PCS is applicable to both the AFIT resident and CID program students. Student PCS costs are included in direct cost of education because they are required in order to get the student to the institution for his academic duty. The average cost per graduate of both the resident basic degree and CID program was $1,640.00. Computations for this element of cost are presented in Table 25.

Table 25

Student PCS Costs (FY 1976)

| | | |
|---|---|---|
| 1. | Actual officer PCS Training Travel Costs (36:81) | $10,579,000 |
| 2. | Number of officer PCS Training Travel moves (36:81) | 6,451 |
| 3. | Average cost of officer PCS Training move | $1,640 |

Temporary Duty (TDY) Travel and Per Diem

This element of cost is incurred by the Air Force when the student is officially ordered to travel to accomplish thesis research or to brief thesis results. This element of cost is applicable to both the AFIT resident and CID programs. The average cost per basic degree program

graduate was $20.00. The average cost per graduate of the CID graduate program was $28.00. Computations for this element of cost are presented in Table 26.

Table 26

Student Temporary Duty Travel and Per Diem

| | | |
|---|---|---|
| 1. | Resident program: | |
| | a. LS Temporary Duty Travel and Per Diem costs for student research (39:786) | $3,492 |
| | b. Percentage of total costs allocated to the basic degree program (Table 18) | .722 |
| | c. Temporary Duty Travel and Per Diem costs assigned to the basic degree program | $2,521 |
| | d. Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| | e. Average cost per basic degree program graduate | $20 |
| 2. | CID Graduate Education program: | |
| | a. CID Temporary Duty Travel and Per Diem costs for student research (39:758) | $10,830 |
| | b. Number of graduates in the CID Graduate Education program | 385 |
| | c. Average cost per CID Graduate Education program graduate | $28 |

Contract Tuition

This element of cost is the tuition the Air Force incurs as a result of enrolling an officer in a master's degree program in a civilian institution. Tuition costs, student activity, building use, application, graduation, transcript, and laboratory fees are included in this cost element. In a full-time, fully-funded CI master's degree program, the Air Force incurs the full cost for tuition and fees. This element of cost is applicable to CI programs but not the AFIT resident program.

The contract tuition cost per graduate at each of the four similar institutions noted in Chapter 3 for FY 76 was:

| | Resident | Nonresident |
|---|---|---|
| George Washington University | $6,727 | |
| Indiana University | $1,536 | $3,398 |
| Pennsylvania State University | $2,056 | $4,146 |
| University of Houston | $ 907 | $2,912 |

Computations for this element of cost are presented in Table 27.

Data Automation

This element of cost was incurred for data automation support from the Department of Academic Computer Support of AFIT/LS. Data automation support includes computer

Table 27

Contract Tuition Costs

| | | | |
|---|---|---|---|
| 1. | George Washington University: | | |
| | a. Cost per semester graduate hour (24:29) | $98 | |
| | b. Total semester graduate hours required (24:157) | 39 | |
| | Total cost for graduate hours | | $3,822 |
| | c. Cost per undergraduate semester (24:29) | $1,300 | |
| | d. Number of prerequisite undergraduate semesters required (24:157) | 2 | |
| | Total cost for undergraduate requirements | | $2,600 |
| | e. University Center fee per semester (24:30) | $50.50 | |
| | f. Number of semesters required per graduate | 5 | |
| | Total University Center fees | | $ 253 |
| | g. Application fee (24:31) | | 25 |
| | h. Graduation fee (24:30) | | 25 |
| | i. Transcript fee (24:31) | | 2 |
| | Total cost per graduate at George Washington University | | $6,727 |

Table 27 (Continued)

2. Indiana University:

| | Resident | Nonresident |
|---|---|---|
| a. Cost per semester graduate hour (12:5) | $ 31 | $ 69 |
| b. Total graduate semester hours required (11:17-19) | 49 | 49 |
| Total cost for graduate hours | $1,519 | $3,381 |
| c. Application fee (12:11) | 15 | 15 |
| d. Transcript fee (12:5) | 2 | 2 |
| Total cost per graduate at Indiana University | $1,536 | $3,398 |

3. Pennsylvania State University:

| | Resident | Nonresident |
|---|---|---|
| a. Cost per term (27:47) | $ 408 | $ 826 |
| b. Number of terms required (27:116) | 5 | 5 |
| Total cost for terms | $2,040 | $4,130 |
| c. Application fee (27:48) | 15 | 15 |
| d. Transcript fee (27:48) | 1 | 1 |
| Total cost per graduate at Pennsylvania State University | $2,056 | $4,146 |

Table 27 (Continued)

4. University of Houston:

| | Resident | Nonresident |
|---|---|---|
| a. Cost per term (includes tuition, student services fees, building use fee, and medical service fee required of all students) (48:47,50) | | |
| 1) Fall or Spring Term | $176 | $606 |
| 2) 6-Week Summer Term | $74.50 | $169.50 |
| 3) 12-Week Summer Term | $119 | $309 |
| b. Number of terms required (47:21; 48:79) | | |
| 1) 4 - Fall and Spring Terms | $704 | $2,424 |
| 2) 1 - 6-Week Summer Term | $74.50 | $169.50 |
| 3) 1 - 12-Week Summer Term | $119 | $309 |
| c. Transcript and graduation fees (48:49-50) | $9 | $9 |
| Total cost per graduate at University of Houston | $907 | $2,912 |

programming, administrative and technical support for the procurement of computer hardware and software, and limited instructional assistance. A portion of the CREATE system of the Headquarters, Air Force Logistics Command computer was also allocated. The Department supported both the AFIT resident and continuing education program; therefore, if the resident program were discontinued, the data automation support would still be required. A portion of these costs were incurred as a direct result of the resident program because of the importance of computers in logistics and the emphasis placed upon computer technology by the program. This element of cost is applicable to the resident program but not the CI program. The average cost per basic degree graduate was $948.00. Computations for this element of cost are presented in Table 28.

Library

This element of cost includes a portion of the operating costs of the AFIT Branch Library. The AFIT Branch library supports both the AFIT resident program and the AFIT continuing education programs. Therefore, if the AFIT resident program were discontinued, the library would still be required. These costs include, but are not limited to, the cost of procuring books, subscriptions for magazines, newspapers, and periodicals, services, and personnel salaries. A portion of the operating cost of the

Table 28

Data Automation Costs

| | | | |
|---|---|---|---|
| 1. | Personnel salaries: | | |
| | a. Data Automation Personnel | | |
| | 1) Four Captains (1; 36:15,22,26) | $72,632 | |
| | 2) Two GS-12 (1; 38:1) | 43,294 | |
| | 3) One Technical Sergeant (1; 36:39,48,57,68) | 11,812 | |
| | 4) One Airman (1; 36:39,48,57,68) | 7,494 | |
| | 5) One GS-4 (1; 38:1) | 8,242 | |
| | Total | | $143,474 |
| | b. Cost of overhead personnel salaries (Department Chief and Secretary) | | |
| | 1) One Major (1; 36:15,22,26) | $21,702 | |
| | 2) One GS-5 (1; 38:1) | 11,309 | |
| | Total | $33,011 | |
| | 3) Percentage allocated to data automation (1) | .5 | |
| | 4) Overhead costs assigned to data automation | $16,506 | 16,506 |
| | c. Total personnel salaries | | $159,980 |
| 2. | Rental of data automation equipment (39:781) | | 9,517 |
| 3. | Average annual cost of "CREATE" computer time (based upon seven months' data) (34) | | 86,976 |
| 4. | Total Data Automation costs | | $256,473 |

Table 28 (Continued)

| | | |
|---|---|---|
| 5. | Percentage of total cost allocated to the resident program (1) | .65 |
| 6. | Data Automation costs assigned to the resident program | $166,707 |
| 7. | Percentage of costs allocated to the basic degree program (Table 18) | .722 |
| 8. | Data Automation costs assigned to the basic degree program | $120,363 |
| 9. | Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| 10. | Average cost per basic degree program graduate | $948 |

library is incurred as a direct result of the AFIT resident program because the materials and services provided by the library are an integral part of education and benefit both the faculty and students. This element of cost is applicable to the resident program but not the CI program. The average cost per basic degree program graduate was $227.00. Computations for this element of cost are presented in Table 29.

Academic Support

This element of cost includes the administrative services and support required for both the students and faculty. Academic support includes, but is not limited to secretarial services, textbook and thesis support payments, a portion of the cost of the "Learning Resources Center," guest speakers, supplies, and audio visual support. The full cost of the Associate Dean of Graduate Education is included in this element because his role is not associated directly with classroom instruction as is that of the faculty. Textbook and thesis support payments are made to both the AFIT resident and CID program graduate students. All other costs incurred in this element are applicable to the AFIT resident program only. The total academic support cost per basic degree program graduate was $671.00. The total academic support cost per CID program graduate was $75.00. Computations for this element of cost are presented in Table 30.

Table 29

AFIT Branch Library Costs

| | | | |
|---|---|---|---|
| 1. | Personnel salaries: | | |
| | a. One GS-11 (7; 38:1) | $19,507 | |
| | b. One GS-9 (7; 38:1) | 14,380 | |
| | c. One GS-4 (7; 38:1) | 8,242 | |
| | d. One GS-3 (7; 38:1) | 7,102 | |
| | Total | | $49,231 |
| 2. | Cost of periodicals, books, audio visual support (10) | | 17,405 |
| 3. | Total AFIT Branch Library costs | | $66,636 |
| 4. | Percentage of the total costs allocated to the resident program (7) | | .60 |
| 5. | AFIT Branch Library costs assigned to the resident program | | $39,982 |
| 6. | Percentage of resident program costs allocated to the basic degree program (Table 18) | | .722 |
| 7. | AFIT Branch Library costs assigned to the basic degree program | | $28,867 |
| 8. | Number of graduates in the basic degree program in Fiscal Year 1976 | | 127 |
| 9. | Average cost per basic degree program graduate | | $227 |

Table 30

Academic Support Costs

| | | | |
|---|---|---|---|
| 1. | Personnel salaries: | | |
| | a. Eight secretaries (32:325-340; 38:1) | $77,820 | |
| | b. Associate dean (Col) (16; 36:15,22,26) | 26,970 | |
| | Total | | $104,790 |
| 2. | Percentage of total cost allocated to the basic degree program (Table 18) | | .722 |
| 3. | Personnel salaries assigned to the basic degree program | | $75,658 |
| 4. | Number of graduates in the basic degree program in Fiscal Year 1976 | | 127 |
| 5. | Average cost per basic degree program graduate | | $596 |
| 6. | Textbook and thesis support allowance per graduate (33:6-4) | | $75 |
| 7. | Total Academic Support costs per basic degree program graduate | | $671 |
| 8. | Total Academic Support costs per CID Graduate Education program graduate (33:6-4) | | $75 |

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Depreciation of Buildings

This element of cost is charged for the depreciation of buildings utilized for the education of students attending the AFIT resident program. Because the buildings are also occupied by other units and support other programs, the resident program would only incur a portion of the total expense. Anthony and Herzlinger indicate that "depreciation expense is needed primarily in connection with computations used as a basis for pricing the services rendered by the responsibility center [2:125]." Although AFIT does not price its services to the Air Force or other agencies, in order to develop the full cost of graduate education, it is necessary to identify the depreciation expense applicable to the AFIT resident program. Depreciation expense is included as a direct cost of education for the resident program. It is not applicable to the CI program, since the Air Force incurs no costs associated with buildings used in civilian institutions (except that which is recovered by the university through tuition and fees). The average cost per graduate of the basic degree program was $29.00. Computations for this element of cost are presented in Table 31.

Printing

This element of cost is incurred by the Air Force for printing services provided for the faculty of the

Table 31

Depreciation Expense of Building 288

| | | |
|---|---|---|
| 1. | The cost of Building 288 (42:39) | $931,000 |
| 2. | Depreciation expense was computed using the straight line method--forty year life and ten percent salvage value [($931,000 - 93,100) ÷ 40] | $20,948 |
| 3. | Percentage allocated to LS based on square feet occupied (Table 18) (15) | .61 |
| 4. | Total depreciation expense assigned to LS | $12,778 |
| 5. | Percentage allocated to the resident program (Table 18) | .40 |
| 6. | Depreciation expense assigned to resident program | $5,111 |
| 7. | Percentage allocated to the basic degree program | .722 |
| 8. | Depreciation expense assigned to the basic degree program | $3,690 |
| 9. | Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| 10. | Average cost per basic degree program graduate | $29 |

resident program. Printing services include, but are not limited to, reprinting current articles and documents for classroom instructional use. This element of cost is applicable to the resident program only. The average cost per graduate of the resident basic degree program was $60.00. Computations are presented in Table 32.

Table 32

Printing Costs

| | | |
|---|---|---|
| 1. | Total LS printing costs (39:781) | $22,419 |
| 2. | Percentage of total costs allocated to the resident program (Table 18) | .471 |
| 3. | Printing costs assigned to the resident program | $10,559 |
| 4. | Percentage allocated to the basic degree program (Table 18) | .722 |
| 5. | Printing costs assigned to the basic degree program | $7,624 |
| 6. | Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| 7. | Average cost per basic degree program graduate | $60 |

## INDIRECT COST OF EDUCATION

Indirect costs of education include those elements of cost incurred by the Air Force for graduate education as a result of support provided by base functional organizations

to both the resident and CI programs. A portion of the functional activities' operating cost is assigned to the resident and CI program because of the support and services that are provided to the AFIT faculty, staff, and students. Base functional organizations justify their operational expenses and budget, in part, upon the total base population which includes the AFIT faculty, staff, and students. In this thesis, "resident program personnel" includes the faculty, staff, and students unless otherwise noted.

Staff Judge Advocate

This element of cost is incurred by the Air Force for legal services provided to the AFIT resident program personnel and the staff and students of the CID program. Although CID students are not assigned to WPAFB for legal services, they are entitled to and would receive comparable legal services afforded a resident program student. Therefore, the average cost per graduate for both programs was $14.00. The monetary value was based upon a proration of the WPAFB Staff Judge Advocate's expenditures to the resident program graduate. Computations for this element of cost and the following elements of cost are presented in Table 33: Chaplain, Base Comptroller, Transportation, Security Police, Safety, Supply Administration, Base Administration, and Services.

Table 33

A Partial List of Service Organization Costs

| Element of Cost | Total | 3.9% AFIT | 31.8% LS | 47.1% LSG | 72.7% Log Mgt | Cost per LSG Graduate | Cost per CID Graduate*** |
|---|---|---|---|---|---|---|---|
| Staff Judge Advocate (39:110) | $ 415,037 | $ 16,186 | $ 5,147 | $ 2,424 | $ 1,750 | $ 14 | $14 |
| Chaplain (39:114) | 409,065 | 15,954 | 5,073 | 2,389 | 1,725 | 14 | 14 |
| Base Comptroller (39:122) | 2,946,227 | 114,903 | 36,539 | 17,210 | 12,426 | 98 | 98 |
| Transportation (39:270-272) | 2,964,455* | 116,614 | 36,765 | 17,316 | 12,502 | 98 | 93 |
| Security Police (39:129) | 2,309,192 | 90,058 | 28,638 | 13,489 | 9,739 | 77 | -- |
| Safety (39:116) | 292,975 | 11,426 | 3,633 | 1,711 | 1,236 | 10 | -- |
| Supply Administration (39:262,264-266) | 1,290,073** | 50,313 | 16,000 | 7,536 | 5,441 | 43 | -- |
| Base Administration (39:108) | 903,804 | 35,248 | 11,209 | 5,279 | 3,812 | 30 | -- |
| Services (39:148,158) | 4,841,781 | 188,829 | 60,048 | 28,283 | 20,420 | 161 | -- |

*Total transportation costs include the following responsibility centers: Transportation Branch; Vehicle Operations and Household Goods, Passenger, Rail, and Freight. Costs consist of personnel overhead expenses only for the last element.

**Total Supply Administration costs include the following resource centers: Chief of Supply; Management and Procedures; Supply Management and Equipment Management. In Supply and Equipment Management only personnel overhead expenses are included.

***Costs for Transportation and Base Comptroller are allocated to CID graduate program students because these services are provided as a result of the PCS move for education and because their pay records are maintained by an Air Force comptroller. Costs for the Staff Judge Advocate and Chaplain are allocated because these services would be provided for the CID graduate program student if needed.

Chaplain

This element of cost is incurred by the Air Force for chaplain services (religious services, marriage counseling, dependent youth activities, etc.) provided to the AFIT resident program personnel and the staff and students of the CID program. Chaplain services would be provided for CID program students, if requested, from the nearest Air Force installation. Therefore, the average cost per graduate for both programs was $14.00. The monetary value was based upon a proration of the WPAFB Chaplain's Office expenditures to the resident program graduate.

Base Comptroller

This element of cost is incurred by the Air Force for budgeting, fiscal control, financial analysis, and accounting and finance (42:8) provided for the AFIT resident program personnel and staff and students of the CID program. The CID program students' finance records are maintained by an Air Force comptroller's office while he is in the education program. Therefore, the average cost per graduate for both programs was $98.00. The monetary value was based upon a proration of the WPAFB Comptroller's expenditures to the resident program graduate.

Transportation

This element of cost is incurred by the Air Force for the transportation services (administrative costs of

personnel who manage PCS and TDY movements, base shuttle bus, taxi service, and etc.) provided for the AFIT resident program personnel and the staff and students of the CID program. The administrative costs associated with arranging for PCS transportation services for both resident and CID program students are incurred by the Air Force. Therefore, the average cost per graduate for both programs was $98.00. The monetary value was based upon a proration of the WPAFB Transportation Branch's expenditures to the resident program graduate.

Security Police

This element of cost is incurred by the Air Force for the increased base security, law enforcement, and special investigations required as a result of the AFIT resident program personnel and the staff of the CID program. The average cost per graduate of the basic degree program was $77.00.

Safety

This element of cost is incurred by the Air Force in order to provide a base safety program. The safety program includes, but is not limited to, review of all unit safety programs, inspections, technical guidance and motor vehicle accident prevention and investigation. This element is applicable to the AFIT resident program personnel and the

staff of the CID program. The average cost per graduate of the basic degree program was $10.00.

Supply Administration

This element of cost is incurred by the Air Force because of the procurement of supplies for the AFIT resident program personnel and the staff personnel of the CID program. Procurement of supplies for the two programs represents an increased administrative workload in addition to providing supplies to other base functions. The average cost per graduate of the basic degree program was $43.00.

Base Administration

This element of cost is incurred by the WPAFB base commander and his staff because base support is provided to the AFIT resident program personnel and the CID staff personnel. The average cost per graduate of the basic degree program was $30.00.

Services

This element of cost is incurred by the Air Force for the following base services: commissary, morale, welfare and recreation, and special services, etc. These services are provided for the AFIT resident program personnel and the CID staff, but not for most CID students who could not take advantage of these services unless located near a base. The average cost per graduate of the basic degree program was $161.00.

Civil Engineering

This element of cost is incurred by the Air Force for "utilities, maintenance of buildings and grounds, custodial services, and fire protection [42:9]" for the facilities used by AFIT resident program personnel and the staff of the CID program. The average cost per graduate of the basic degree program was $612.00. Computations for this element of cost are presented in Table 34.

Table 34

Civil Engineering Services

| | | |
|---|---|---|
| 1. | Total Civil Engineering operating expenses (39:236) | $35,965,814 |
| 2. | Total square footage occupied at WPAFB (43) | 12,507,475 sq. ft. |
| 3. | Cost of Civil Engineering services per square foot occupied | $2.88 per sq. ft. |
| 4. | Square footage occupied by the resident program (18) | 37,350 |
| 5. | Total Civil Engineering costs assigned to the resident program | $107,568 |
| 6. | Percentage of total cost allocated to the basic degree program | .722 |
| 7. | Civil Engineering cost assigned to the basic degree program | $77,664 |
| 8. | Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| 9. | Average cost per basic degree program graduate | $612 |

Communications/Electronics

This element of cost is incurred by the Air Force for communications and electronics services provided to the AFIT resident program personnel and the CID staff. The cost is a prorated portion of lease lines, toll calls, and common user communication services. The average cost per graduate of the basic degree program was $41.00. Computations for this element of cost are presented in Table 35.

Command Overhead (USAF, AU, AFIT, LS)

This element of cost is that portion of the cost of the USAF, AU, AFIT, and LS Command Sections that the Air Force incurs as a result of the AFIT resident and CID programs. A portion of the workload, manning, and expenses of the USAF, AU, and AFIT Command Section is based on and justified for management of the AFIT resident and CID programs. In addition, both programs have their own separate command sections. The average cost per graduate for the basic degree was $1,069.00. The average cost per graduate for the CID program was $973.00 based upon the staff expenditures for the FY 76 CID program. Computations for this element of cost are presented in Table 36.

Personnel Administration

This element of cost is incurred by the Air Force for maintenance of the personnel records, publishing of orders, personnel actions, etc. of the AFIT resident

Table 35

Communications/Electronics

| | | Administrative Communication Costs (39:159) | AFIT Lease Line (39:734) |
|---|---|---|---|
| 1. | Total costs | $683,765 | $21,701 |
| 2. | Percentage of total costs allocated to AFIT (Table 18) | .039 | 1.00* |
| 3. | Total costs assigned to AFIT | $26,667 | $21,701 |
| 4. | Percentage allocated to LS (Table 18) | .318 | .318 |
| 5. | Total costs assigned to LS | $8,480 | $6,901 |
| 6. | Percentage allocated to the resident program (Table 18) | .471 | .471 |
| 7. | Total costs assigned to the resident program | $3,994 | $3,250 |
| 8. | Percentage allocated to the basic degree program (Table 18) | .722 | .722 |
| 9. | Total costs assigned to the basic degree program | $2,884 | $2,347 |
| 10. | Number of graduates in the basic degree program in Fiscal Year 1976 | 127 | 127 |
| 11. | Average cost per basic degree program graduate | $23 | $18 |
| 12. | Average total per graduate | | $41 |

*100 percent applied to AFIT costs.

Table 36

Command Overhead

| | | |
|---|---|---|
| 1. | Headquarters USAF (Hq USAF) overhead costs applied to resident program and CID Graduate Education program (55) | |
| | a. Personnel salaries: | |
| | 1) 25 percent of one Lieutenant Colonel (55; 36:15,22,26) | $6,538 |
| | 2) .0825 percent of one GS-5 secretary (55; 38:1) | $933 |
| | b. Total Hq USAF overhead costs assigned to the resident degree program and CID Graduate Education program | $7,471 |
| | c. Percentage allocated to the basic degree program (Table 18) | .722 |
| | d. Hq USAF costs assigned to the basic degree program | $5,394 |
| | e. Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| | f. Average cost per basic degree program graduate | $43 |
| | g. Percentage allocated to the CID Graduate Education program (Table 18) | .127 |
| | h. Hq USAF cost assigned to the CID Graduate Education program | $949 |
| | i. Number of graduates in the basic degree program in Fiscal Year 1976 | 385 |
| | j. Average cost per CID Graduate Education program graduate | $2 |

Table 36 (Continued)

| | | |
|---|---|---|
| 2. | Headquarters Air University (Hq AU) overhead costs applied to the resident program and CID Graduate Education program | |
| | a. Total Hq AU overhead costs (56) | $8,378,500 |
| | b. Percentage allocated to AFIT (56) | .092 |
| | c. Hq AU overhead costs assigned to AFIT | $770,822 |
| | d. Percentage allocated to the resident program (Table 18) | .038 |
| | e. Percentage allocated to the CID Graduate Education program (Table 18) | .802 |
| | f. Hq AU overhead costs assigned to the resident program | $29,291 |
| | g. Hq AU overhead costs assigned to the CID Graduate Education program | $618,199 |
| | h. Percentage allocated to the basic degree program (Table 18) | .722 |
| | i. Percentage allocated to the CID Graduate Education program (Table 18) | .127 |
| | j. Hq AU overhead costs assigned to the basic degree program | $21,148 |
| | k. Hq AU overhead costs assigned to the CID Graduate Education program | $78,511 |
| | l. Number of graduates in the basic degree program | 127 |
| | m. Number of graduates in the CID Graduate Education program | 385 |
| | n. Average cost per basic degree program graduate | $167 |
| | o. Average cost per CID Graduate Education program graduate | $204 |

Table 36 (Continued)

| | | |
|---|---|---|
| 3. | AFIT overhead costs (39,728-729, 731,733,739,741,749) | |
| | a. Total AFIT overhead costs | $2,117,005 |
| | b. Percentage allocated to the LS resident program (Table 18) | .038 |
| | c. Percentage allocated to the CID program (Table 18) | .802 |
| | d. AFIT overhead costs assigned to the LS resident program | $80,446 |
| | e. AFIT overhead costs assigned to the CID program | $1,697,838 |
| | f. Percentage allocated to the basic degree program (Table 18) | .722 |
| | g. Percentage allocated to the CID Graduate Education program (Table 18) | .127 |
| | h. AFIT overhead costs assigned to the basic degree program | $58,082 |
| | i. AFIT overhead costs assigned to the CID Graduate Education program | $215,625 |
| | j. Number of graduates in the basic degree program in Fiscal Year 1976 | 127 |
| | k. Number of graduates in the CID Graduate Education program in 1976 | 385 |
| | l. Average cost per basic degree program graduate | $457 |
| | m. Average cost per CID Graduate Education program graduate | $560 |

Table 36 (Continued)

| | | | |
|---|---|---|---|
| 4. | School of Systems and Logistics overhead costs | | |
| | a. Total LS overhead costs | | |
| | 1) One colonel (36:15,22,26; 44) | $30,994 | |
| | 2) One captain (36:15,22,26; 44) | 18,158 | |
| | 3) One master sergeant (36:39,48,57,68; 44) | 13,609 | |
| | 4) One technical sergeant (36:39,48,57,68; 44) | 11,812 | |
| | 5) One airman (36:39,48,57,68; 44) | 7,492 | |
| | 6) One GS-6 (38:1; 44) | 10,942 | |
| | 7) Two GS-5 (38:1; 44) | 19,042 | |
| | 8) TDY travel and per diem (39:781) | 32,803 | |
| | 9) Rental of equipment (39:781) | 5,448 | |
| | 10) Total | | $150,300 |
| | b. Percentage allocated to the resident program (Table 18) | | .471 |
| | c. LS overhead costs assigned to the resident program | | $70,791 |
| | d. Percentage allocated to the basic degree program (Table 18) | | .722 |
| | e. LS overhead costs assigned to the basic degree program | | $51,111 |
| | f. Number of graduates in the basic degree program in Fiscal Year 1976 | | 127 |
| | g. Average cost per basic degree program graduate | | $402 |

Table 36 (Continued)

| | |
|---|---|
| 5. Civilian Institutions Directorate overhead costs | |
| a. Overhead costs: | |
| 1) CID headquarters and staff (39:753) | $528,102 |
| 2) Percentage allocated to the CID Graduate Education program (Table 18) | .127 |
| 3) Total assigned to CID Graduate Education program | $67,069 |
| 4) CID Graduate Education program travel | 9,232 |
| 5) CID Graduate Education program per diem | 3,415 |
| 6) CID Graduate Education program vehicle rental | 147 |
| 7) Total | $79,863 |
| 8) Number of CID Graduate Education program graduates in Fiscal Year 1976 | 385 |
| 9) Average cost per CID Graduate Education program graduate | $207 |

program personnel and staff and students of the CID program. The AFIT Consolidated Base Personnel Office (CBPO) provides these services for all AFIT personnel. Therefore, the average cost per graduate for both programs was $166.00 based upon the AFIT CBPO expenditures. Computations for this element of cost are presented in Table 37.

Table 37

Personnel Administration

| | | | |
|---|---|---|---|
| 1. | Total cost of the AFIT CBPO (39:747) | | $886,321 |
| 2. | Total number of personnel supported by the AFIT CBPO | | |
| | a. Civilian Institution enrollment as of 30 June 1976 (29:5) | 4,517 | |
| | b. LS enrollment as of 30 June 1976 (29:4) | 156 | |
| | c. Engineering School enrollment as of 30 June 1976 (29:1) | 366 | |
| | d. Faculty and staff (AF only) as of 1 April 1976 (31:11) | 292 | |
| | Total | | 5,331 |
| 3. | Average cost of personnel administration per person | | $166 |
| 4. | Cost allocated per graduate for the resident and the CID graduate program | | $166 |

Medical Services

This element of cost is incurred by the Air Force in order to provide medical and dental care to both the AFIT resident and CID program personnel. Medical and dental care is provided to all Air Force military members regardless of their duty assignment or location. The average cost prorated per military member and, therefore, to the graduates of both programs was $852.00 (22).

## PAY AND ALLOWANCES

Pay and allowances include those elements of cost that the Air Force incurs and is obligated to pay the individual based upon rank, years of service for pay purposes, marital status, place of residence, and special duties. These costs are standardized throughout the Air Force based upon the specific criteria noted above and are incurred by both the AFIT resident and CID programs. Inclusion of these costs in the full cost of education is necessary because they are an additional expense incurred by the Air Force to achieve the single cost objective of providing officers with a master's degree. These costs include the base pay and subsistance and quarters allowance that the Air Force is obligated to pay the student. In addition, unfunded military retirement benefits are included in this element of cost. This element of cost is applicable to the students of both the AFIT resident and CID programs. The pay and

allowance per graduate differs for each program based upon an estimate of the number of months necessary to complete the prescribed course requirements. The cost of pay and allowances per graduate of the basic degree program was $21,245.00. The cost of pay and allowances per graduate of the four similar institutions was: George Washington University, $35,404; Indiana University, $28,323; Pennsylvania State University, $31,864; University of Houston, $28,323. Computations for this element of cost are presented in Table 38.

## SUMMARY OF COSTS PER GRADUATE

The full cost of the AFIT basic degree graduate based upon the elements of cost presented in this chapter is $32,316. The full cost of each of the similar programs is as follows: George Washington University, $46,014; Indiana University, $33,742 (Resident) and $35,604 (Non-Resident); Pennsylvania State University, $37,803 (Resident) and $39,893 (Nonresident); and University of Houston, $33,113 (Resident) and $35,118 (Nonresident). A summary and comparison of all elements of cost is presented in Table 39.

Table 38

Pay and Allowances Cost

| | |
|---|---|
| 1. AFIT Resident Program | |
| a. The average pay and allowances per graduate[1] was based upon the one year AFIT resident program. The cost was (36:15,22,26; 30:100) | $18,158 |
| b. The cost of unfunded military retirement ($18,158 X .17) | 3,087 |
| c. Total cost per graduate | $21,245 |
| 2. George Washington University | |
| a. The average pay and allowances per graduate for one month was (36:15,22,26) ($18,158 ÷ 12) | $ 1,513 |
| b. Months needed to complete program based on fulltime study and no more than 15 hours per semester (24:145) | 20 |
| c. Total pay and allowances per graduate ($1,513 X 20) | $30,260 |
| d. The cost of unfunded military retirement ($30,260 X .17) | 5,144 |
| e. Total cost per graduate | $35,404 |

[1]In this thesis, the modal student is a married Captain (9).

Table 38 (Continued)

| | | |
|---|---|---|
| 3. | Indiana University | |
| | a. The average pay and allowances per graduate for one month was (36:15,22,26) ($18,158 ÷ 12) | $ 1,513 |
| | b. Months needed to complete program based on fulltime study and no more than 16 hours per semester (fall and spring) or 9 hours for summer session (12:13) | 16 |
| | c. Total pay and allowances per graduate ($1,513 X 16) | $24,208 |
| | d. The cost of unfunded military retirement ($24,208 X .17) | 4,115 |
| | e. Total cost per graduate | $28,323 |
| 4. | Pennsylvania State University | |
| | a. The average pay and allowances per graduate for one month was (36:15,22,26) ($18,158 ÷ 12) | $ 1,513 |
| | b. Months needed to complete program based on fulltime study and 8 to 10 hours per term (27:60) | 18 |
| | c. Total pay and allowances per graduate ($1,513 X 18) | $27,234 |
| | d. The cost of unfunded military retirement ($27,234 X .17) | 4,630 |
| | e. Total cost per graduate | $31,864 |

Table 38 (Continued)

| | | |
|---|---|---|
| 5. | University of Houston | |
| | a. The average pay and allowances per graduate for one month was (36:15,22,26) ($18,158 ÷ 12) | $ 1,513 |
| | b. Months needed to complete program based on fulltime study and 12 semester hours during the fall and spring; 3 hours during 6-week summer term and 6 hours during 12-week summer term (48:79) | 16 |
| | c. Total pay and allowances ($1,513 X 16) | $24,208 |
| | d. The cost of unfunded military retirement ($24,208 X .17) | 4,115 |
| | e. Total cost per graduate | $28,323 |

Table 39

Summary of Costs per Graduate

| | AFIT | G.W. | Indiana | | Penn State | | Houston | |
|---|---|---|---|---|---|---|---|---|
| | | | Res | Nonres | Res | Nonres | Res | Nonres |
| Direct Cost of Education | | | | | | | | |
| Faculty | $ 3,595 | $ | $ | $ | $ | $ | $ | $ |
| Military Retirement-Faculty | 498 | | | | | | | |
| Faculty PCS | 98 | | | | | | | |
| Student PCS | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 | 1,640 |
| Student TDY Travel and Per Diem | 20 | 28 | 28 | 28 | 28 | 28 | 28 | 28 |
| Contract Tuition | | 6,727 | 1,536 | 3,398 | 2,056 | 4,146 | 907 | 2,912 |
| Data Automation | 948 | | | | | | | |
| Library | 227 | | | | | | | |
| Academic Support | 671 | 75 | 75 | 75 | 75 | 75 | 75 | 75 |
| Depreciation of Bldg. | 29 | | | | | | | |
| Printing | 60 | | | | | | | |
| Total | 7,786 | 8,470 | 3,279 | 5,141 | 3,799 | 5,889 | 2,650 | 4,655 |
| Indirect Cost of Education | | | | | | | | |
| Staff Judge Advocate | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Chaplain | 14 | 14 | 14 | 14 | 14 | 14 | 14 | 14 |
| Base Comptroller | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| Transportation | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| Security Police | 77 | | | | | | | |
| Safety | 10 | | | | | | | |
| Supply Administration | 43 | | | | | | | |
| Base Administration | 30 | | | | | | | |
| Services | 161 | | | | | | | |
| Civil Engineering | 612 | | | | | | | |
| Communication/ Electronic | 41 | | | | | | | |
| Personnel Administration | 166 | 166 | 166 | 166 | 166 | 166 | 166 | 166 |
| Medical Services | 852 | 852 | 852 | 852 | 852 | 852 | 852 | 852 |
| Command Overhead | 1,069 | 973 | 973 | 973 | 973 | 973 | 973 | 973 |
| Total | 3,285 | 2,215 | 2,215 | 2,215 | 2,215 | 2,215 | 2,215 | 2,215 |
| Pay and Allowances | 21,245 | 35,404 | 28,323 | 28,323 | 31,864 | 31,864 | 28,323 | 28,323 |
| Total Cost per Graduate | $32,316 | $46,089 | $33,817 | $35,679 | $37,878 | $39,968 | $33,188 | $35,193 |

# Chapter 5

# CONCLUSIONS AND RECOMMENDATIONS

## OVERVIEW

The objective of this thesis was to make a comparative analysis of the full cost to the Air Force of providing an officer with a Master of Science degree in Logistics Management from AFIT (resident program) with the full cost of a similar degree from a civilian institution (CI). Similar CI graduate degree programs were identified, the elements of cost necessary to make the comparison were identified, and the monetary value of each element of cost was determined. The elements of cost were subdivided into three major categories in order to facilitate the comparative analysis and highlight the areas of greatest cost divergence. In addition, all costs have been documented; and all sources necessary to replicate this comparative cost analysis have been identified. In this chapter the results and implications of the cost analysis are presented and recommendations for future study are made.

## CONCLUSIONS

Based upon the data presented in Chapter 4, the full cost to the Air Force per graduate from the AFIT resident

program was less than the full cost per graduate from the four similar CI programs evaluated. The full cost per graduate from the AFIT resident program was $32,316. However, the full cost per graduate of the four similar CI programs evaluated was: University of Houston, $33,188 (resident) and $35,193 (nonresident); Indiana University, $33,817 (resident) and $35,679 (nonresident); Pennsylvania State University, $37,878 (resident) and $39,968 (nonresident); and George Washington University, $46,089. The data presented in Chapters 2 and 4 indicate that contract tuition is not the only consideration and element of cost that should be considered when determining the full cost to the Air Force for CI graduate education. In addition, the following factors should be evaluated: the time required to complete the graduate degree program; the impact on the Air Force graduate education programs of increasing the number of CI students; the unique emphasis that AFIT places on logistics in the military environment and AFIT's ability to keep graduate course content current with respect to the latest Air Force developments and technological changes.

Direct Costs of Education

There was a wide range of total cost in the direct cost of education category. The University of Houston had the least direct cost of education, $2,650, for its resident program compared to $7,786 for the AFIT resident program.

The difference was because the tuition fees at major universities are designed to cover only a portion of the total operating expenses of the university. Most universities depend upon grants, endowments, and state and federal subsidies to partially offset maintenance and operating expenses. The direct costs of the AFIT resident program are incurred by the Air Force and cover all operating expenses. However, it is important to note that not all of the direct costs of the resident program would represent a savings to the Air Force if the AFIT resident program were terminated. Many of the expenses would be transferred to other responsibility centers, i.e. depreciation expenses would be transferred to the organization(s) occupying the building. Therefore, the Air Force would not realize all of the direct costs of education in savings if the AFIT resident program were terminated.

Indirect Costs of Education

Indirect costs of education were incurred because the students of the AFIT resident program were a part of the total population of Wright-Patterson AFB and were prorated an average share of the operating and maintenance expenses of base support activities. However, in some cases, the indirect costs of education are, in fact, benefits that the Air Force provides all members, i.e. medical and dental services, legal services, etc. Therefore, the

cost of these benefits were prorated to the CI program students based upon the average developed for the resident program students. The costs that were prorated to only resident program students would be assumed by the other base personnel on a prorated basis if the resident program were terminated. In addition, if the Air Force were to increase the number of students in CI programs, the overhead costs of the Civilian Institutions Directorate would increase because of the additional personnel required to monitor the increased student population, more expenses for communication to coordinate the greater activity, etc.

Time Required for a Graduate Degree

The single most expensive element of cost to the Air Force for providing an officer with a graduate degree is pay and allowances. The time required to complete the graduate degree program dictates how expensive this element of cost will be for the Air Force. All organizations which attempt to improve the quality of their management through education encounter the same dilemma--to provide the highest quality education in the shortest time possible. Often this cost is ignored or overlooked while attempting to minimize the cost of the program. The AFIT resident program requires one year to complete all graduate degree requirements, whereas the minimum time required to complete the four similar CI programs was sixteen to twenty months.

This four to eight month difference represents approximately $7,078 to $14,156 in pay and allowances. Therefore, in order to insure the most cost effective graduate degree program possible, the time required to complete the program is a key factor because the Air Force is committed to pay the student his regular pay and allowances while he is enrolled in a graduate degree program.

Qualitative Factors

The AFIT resident program places primary emphasis on logistics management in the military environment because the program is designed to offer graduate education that meets current and projected Air Force needs. The qualitative benefits derived from such a program are difficult, if not impossible, to measure in terms of cost. General McPherson emphasized that qualitative benefits do not lend themselves to quantitative measures (17:43-45). However, two theses (5; 8) that were concerned with the measurement of quantitative benefits in terms of managerial performance concluded that the AFIT graduate's managerial performance exceeds that of individuals with no graduate degree and individuals with a graduate degree from a civilian institution. Although the full cost of some CI programs was almost comparable to the full cost of the AFIT program, the fact remains that the benefits derived from the AFIT resident

program in terms of managerial performance in the military environment exceeds those derived from CI programs.

Civilian institutions offer graduate education in logistics management with primary emphasis on business logistics. Although there are many similarities in business and military logistics, significant differences do exist and these differences cannot be ignored. Because of these differences there is a strong possibility that CI graduates would have to have special integrative training in order to apply the concepts learned through a CI program. Such integrative training would result in additional costs to the Air Force which were not considered in this thesis. The AFIT resident program is designed to provide this type of training as a part of the degree program.

The AFIT resident program is in a continuing process of update and reevaluation in order to incorporate the latest developments and technological changes. For instance, the student has available to him one of the most modern computer systems in the Air Force. By the use of remote terminals and programming experience, the student is able to apply modern problem solving techniques to assist him in course work throughout the program. Computer science is not integrated throughout the twelve CI programs evaluated as it is in the AFIT resident program.

## RECOMMENDATIONS

Based on the results of this thesis, the authors feel there are several recommendations that should be considered. First, because this thesis provides a model in which to analyze the cost of an AFIT program, other resident programs should be analyzed to determine their full cost in order to see if they too are less expensive than similar civilian programs. Furthermore, we recommend that a study be accomplished to determine the amount a private or civilian industry spends in providing graduate education to its managerial personnel. A study should be done to determine how much the full cost of a civilian education is when all costs in terms of subsidies from state and federal governments, endowments, and grants are considered. A comprehensive review should be made to identify all civilian institutions which have a logistics related master's degree program similar to the AFIT resident program. Finally, the studies to determine the effectiveness of AFIT resident and CI program graduates (5; 8) should be reaccomplished to revalidate the conclusions since the studies are now over six years old.

# SELECTED BIBLIOGRAPHY

## A. REFERENCES CITED


1. Abbott, Major James E., USAF. Chief, Directorate of Data Automation, AFIT, Wright-Patterson AFB OH. Personal interview. 1 August 1977.

2. Anthony, Robert N., and Regina E. Herzlinger. Management Control in Nonprofit Organizations. Homewood IL: Richard D. Irwin, Inc., 1975.

3. Arceneaux, Captain R. J., USAF. "SLG vs. Civilian Curricula." Unpublished working papers. AFIT/LSG, Wright-Patterson AFB OH, 1976.

4. Carnegie Commission on Higher Education. Higher Education: Who Pays? Who Benefits? Who Should Pay? New York: McGraw-Hill Book Company, 1973.

5. Chamberlin, Captain Brian, USAF, and Captain Richard A. Smith, USAF. "A Determination of the Benefits Derived by the Air Force from Providing Air Force Officers in Logistics Field with Graduate Degrees in Business Area from Civilian Graduate Institutions." Unpublished Master's thesis. SLSR 15-72A, AFIT/SL, Wright-Patterson AFB OH, 1972.

6. DeHayes, Daniel W., Jr. "Education for Logistics Management," Logistics Spectrum, Spring 1970, pp. 17-21,32.

7. Eckles, Virginia. Head Librarian, AFIT Branch Library, AFIT/LS, Wright-Patterson AFB OH. Personal interview. 14 July 1977.

8. Hale, Captain Jerry W., USAF, and Captain Basil E. Rooney, USAF. "A Determination of the Benefits Derived by the Air Force in Providing Graduate Logistics Management Education at the School of Systems and Logistics." Unpublished Master's thesis. SLSR 23-71A, AFIT/SL, Wright-Patterson AFB OH, 1971.

9. Haynes, Captain Ralph R., USAF, and Captain Dennis A. Williamson, USA. "The Representative AFIT Student: A Statistical Analysis." Unpublished term paper, AFIT/LS, Wright-Patterson AFB OH, March 1977.

10. Helton, H. L. Funds Manager, Academic Library, AFIT, Wright-Patterson AFB OH. Telephone interview. 8 August 1977.

11. Indiana University. Indiana University Bulletin, Bulletin of the Graduate School of Business, Volume LXXV, Number 4. Bloomington IN: Indiana University from the University Office, 20 January 1977.

12. _____. Indiana University Bulletin 1975-76, Graduate School, LXXII, Number 26. Bloomington IN: Indiana University from the University Office, 30 November 1974.

13. Julich, Arnold J., USAF, and First Lieutenant Marjorie A. O'Connell, USAF. "An Evaluation of the Air Force Advanced Academic Degree Management System." Unpublished Master's thesis. SLSR 45-75B, AFIT/SL, Wright-Patterson AFB OH, 1975.

14. Keucher, Ernest R. Academic Evaluation and Guidance Counselor, Admissions Directorate, AFIT, Wright-Patterson AFB OH. Personal interview. 3 August 1977.

15. Kitch, Lieutenant Colonel John I., Jr., USAF. Chief, Directorate of Educational Plans and Operations. Letter, subject: Space Agreement, to Civil Engineering Squadron, Real Estate Management Section, 2750th Air Base Wing, Wright-Patterson AFB OH, undated.

16. McKemey, Major Dale R., USAF. Instructor, Department of Research and Administrative Management, Graduate Education Division, AFIT/LS, Wright-Patterson AFB OH. Personal interview. 28 July 1977.

17. McPherson, Lieutenant General John B., USAF (Retired). "Greater Education Equals Greater Military Efficiency," National Defense, July-August 1975, pp. 43-45.

18. Musselman, Captain Thurman T., USAF. Executive Officer, AFIT/LS, Wright-Patterson AFB OH. Personal interview. 25 July 1977.

19. National Education Committee of the Society of Logistics Engineers. Logistics Education and Training Guide for the Society of Logistics Engineers (SOLE). Unpublished report. International Headquarters, Huntsville AL, 2 January 1976.

20. Newton, Captain Gary F., USAF. "Programs in Logistics Offered Through Civilian Institutions." Unpublished memorandum. AFIT/CID, Wright-Patterson AFB OH, 5 March 1975.

21. Parlett, Colonel Henry W., USAF. Associate Dean for Graduate Education, AFIT/LS. Letter, subject: Response to Hq USAF/LGXY Letter 11 June 1976, to Hq USAF/LGXY, 14 July 1976.

22. Sullenger, Carl. Budget Analyst, Program Budget Office, Office of the Assistant Secretary of Defense, Comptroller, Pentagon, Washington, D.C. Telephone interview. 8 August 1977.

23. The American University. The AU Bulletin 1974-1975, Volume 51, Number 1. Washington, D.C.: Office of University Publications, September 1974.

24. The George Washington University. The George Washington Bulletin, Undergraduate and Graduate Catalogue 1976-77, Volume LXXV, Number 4. Washington, D.C.: The University, May 1976.

25. The Ohio State University. The Ohio State University Bulletin, Course Offerings 1976-77, Volume LXXX, Number 6. Columbus OH: The Ohio State University, 6 April 1976.

26. _____. The Ohio State University Bulletin, Undergraduate Course Offerings, 1973-74, Volume LXXVII, Number 7. Columbus OH: The Ohio State University, 4 April 1973.

27. The Pennsylvania State University. The Pennsylvania State University Bulletin, Volume LXX, Number 2. University Park PA: The Pennsylvania State University, September 1976.

28. U.S. Department of the Air Force. AFIT Continuing Education Programs Report: 14 July 1976. Directorate of Education Plans and Operations, AFIT, Wright-Patterson AFB OH, 14 July 1976.

29. _____. AFIT Degree and Other Extended Programs Report (First Revision, Fiscal Year 1976): 1 September 1976. Directorate of Education Plans and Operations, AFIT, Wright-Patterson AFB OH, 1 September 1976.

30. _____. Air Force Institute of Technology, Catalog 1976-1978, Volume XVI, Number 1. AFIT (AU), Wright-Patterson AFB OH, 1976.

31. _____. Base Tenant and Strength Report: 1 April 1976. Administrative Division, 2750th Air Base Wing, Wright-Patterson AFB OH, 1 April 1976.

32. _____. Civilian Assigned Strength Report: 3 July 1977. Civilian Personnel Branch, 2750th Air Base Wing, Wright-Patterson AFB OH, 3 July 1977.

33. _____. Civilian Institution Student Regulation, AFIT Regulation 53-1. Headquarters, AFIT (AU), Wright-Patterson AFB OH, 1 July 1976.

34. _____. CREATE Problem Number Management Data. Systems Management Division, Directorate of ADP Resources, Headquarters AFLC, Wright-Patterson AFB OH, July 1975-June 1976.

35. _____. Formal Training Course Cost Report, RCS: HAF-ACM (AR) 7108, FY 75. Headquarters Air University, Maxwell AFB AL, 12 September 1975.

36. _____. Justification of Estimates for Fiscal Year 1978, Submitted to Congress January 1977: Military Personnel, Air Force. Office of the Assistant Secretary of Defense, Comptroller, Pentagon, Washington, D.C., January 1977.

37. _____. Organization and Mission--Field, Air Force Institute of Technology. Air University Regulation 23-3. Headquarters Air University, Maxwell AFB AL, 20 July 1976.

38. _____. Personnel. Issue 5. Civilian Personnel Branch, 2750th Air Base Wing, Wright-Patterson AFB OH, October 1975.

39. _____. RC Manager Cost Center Report: 30 June 1976. Accounting and Finance Office, 2750th Air Base Wing, Wright-Patterson AFB OH, 30 June 1976.

40. _____. RC Manager Monthly Report: 30 June 1976. Accounting and Finance Office, 2750th Air Base Wing, Wright-Patterson AFB OH, 30 June 1976.

41. _____. Report of a Study on AFIT Resident Programs and Costs. Air Force Institute of Technology (AU), Wright-Patterson AFB OH, 18 September 1972.

42. _____. Report of Graduate Education Costs and Manning Methodology. Headquarters Air University, Maxwell AFB AL, 28 May 1976.

43. _____. USAF Real Property Inventory Detail List: 16 June 1977. Civil Engineering Squadron, Real Estate Management Section, 2750th Air Base Wing, Wright-Patterson AFB OH, 16 June 1977.

44. _____. Unit Personnel Management Roster. Director of Military Personnel, AFIT, Wright-Patterson AFB OH, 28 September 1975.

45. U.S. General Accounting Office. Improvement Needed in Determining Graduate Education Requirements for Military Officer Positions. Report No. B-165558. Washington, D.C.: Government Printing Office, 28 August 1970.

46. _____. Financial Operations of the Five Service Academies. Report No. B-159219. Washington, D.C.: Government Printing Office, 6 February 1975.

47. University of Houston. The University of Houston Bulletin, College of Business Administration 1976-77 Issue, Volume 40-C, Number 2. Houston TX: University of Houston, January 1976.

48. _____. The University of Houston Bulletin, General Information 1976-77 Issue, Volume 41-A, Number 7. Houston TX: University of Houston, May 1976.

49. University of Maryland. The Graduate Catalog 74-75. College Park MD: College Park Campus Publications, June 1974.

50. University of Miami. The Bulletin University of Miami, Undergraduate Studies, Volume 51, Number 1. Miami FL: University of Miami, September 1976.

51. _____. The Bulletin University of Miami, Graduate School, Volume 49, Number 2. Miami FL: University of Miami, September 1974.

52. University of Minnesota. University of Minnesota Bulletin, Graduate School, Volume LXXVII, Number 13. Minneapolis MN: University of Minnesota, Office of Admissions and Records, 31 July 1974.

53. University of Oregon. University of Oregon General Catalog, 1976-77, New Series, Number 13. Eugene OR: Oregon State Board of Higher Education, 1976.

54. University of Southern California. Bulletin of the University of Southern California, The Graduate School, 1976-77, Volume 12, Number 2. Los Angeles CA: University of Southern California, 30 July 1976.

55. University of Tennessee. The University of Tennessee Record, Graduate Studies 1977, Volume 80, Number 1. Knoxville TN: University of Tennessee, January 1977.

56. Wise, Lieutenant Colonel Glen, USAF. Professional Education Programs, Directorate of Personnel Programs, Deputy Chief of Staff for Personnel, Headquarters USAF, Washington, D.C. Telephone interview. 25 July 1977.

57. Wright, Kathy. Analyst, Management Analysis, Comptroller, Headquarters Air University, Maxwell AFB AL. Telephone interview. 28 July 1977.

## B. RELATED SOURCES

Brown, Dean, and others. "Survey of the Use of Educational Technology in the Armed Services." Unpublished research report. Stanford Research Institute, Menlo Park CA, November 1973. AD 770 884.

Deener, David R., and Joseph L. McCarthy. The Costs and Benefits of Graduate Education: A Commentary with Recommendations. Washington, D.C.: The Council of Graduate Schools, March 1972.

Ford, Colonel Thomas S., USAF. Director, Educational Plans and Operations, AFIT. Letter, subject: AFIT Student/Faculty Ratio, to AFAA (AU), 13 May 1977.

U.S. Department of the Air Force. Expense and Output Data, Fiscal Year 1971. Directorate of Accounting & Finance, Directorate of Management Analysis, Deputy Chief of Staff, Comptroller, Headquarters Air University, Maxwell AFB AL, 1971.

Visscher, Colonel Robert E., USA. "A Revised System for Validating Army Graduate Education Requirement." Unpublished research report, unnumbered, U.S. Army War College, Carlisle Barracks PA, 4 April 1975. AD A012620.

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