



**ESTIMATING THE OPERATING AND SUPPORT COST DIFFERENCE
AMONG TAAF C-130E, C-130B AND USAF C-130J AIRCRAFT**

THESIS

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Abstract

This study addresses the operation and support cost differences between the TUAf C-130E & C-130B, and the USAF C-130J aircraft. The TUAf C-130s have been being used for more than 30 years and changing world situations give armed forces different roles, and Turkey participates in all peacekeeping missions that are assigned by NATO (North Atlantic Treaty Organization) and the United Nations. While performing these roles, the importance of air mobility and the importance of reliability became widely appreciated. Moreover, the coming retiring age of the existing C-130s in the TUAf forced the TUAf to look for ways to improve its air mobility. Under these conditions the TUAf is trying to find a way to decrease these interruptions in the missions and to increase the capability of carrying more personnel and materials so as to increase the effectiveness of Air Lift missions. There are two ways to accomplish this target: 1. Refurbish the existing C-130s and increasing its reliability. 2. Buy the newest version of C-130 Hercules, the C-130J. This study investigates the O&S cost difference among the aircraft by establishing a model to assess the O&S cost that can be used to evaluate the competing alternatives as well as the replacement decision for the existing systems. Cost Oriented Resource Estimation (CORE) model utilized in establishing the model. Sensitivity Analysis, and Breakeven Analysis are applied to the cost figures over

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AMONG TAAF C-130E, C-130B AND USAF C-130J AIRCRAFT

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Abstract

This study addresses the operation and support cost differences between the TUAf C-130E & C-130B, and the USAF C-130J aircraft. The TUAf C-130s have been being used for more than 30 years and changing world situations give armed forces different roles, and Turkey participates in all peacekeeping missions that are assigned by NATO (North Atlantic Treaty Organization) and the United Nations. While performing these roles, the importance of air mobility and the importance of reliability became widely appreciated. Moreover, the coming retiring age of the existing C-130s in the TUAf forced the TUAf to look for ways to improve its air mobility.

Under these conditions the TUAf is trying to find a way to decrease these interruptions in the missions and to increase the capability of carrying more personnel and materials so as to increase the effectiveness of Air Lift missions. There are two ways to accomplish this target:

Refurbish the existing C-130s and increasing its reliability.

1. Buy the newest version of C-130 Hercules, the C-130J

This study investigates the O&S cost difference among the aircraft by establishing a model to assess the O&S cost that can be used to evaluate the competing alternatives as well as the replacement decision for the existing systems.

Cost Oriented Resource Estimation (CORE) model utilized in establishing the model. Sensitivity Analysis, and Breakeven Analysis are applied to the cost figures over

40 years. The analysis showed that C-130J amortizes itself in the lifetime of the cargo aircraft. In addition to that improved avionic, and propulsion systems increase the efficiency and effectiveness of the air mobility.

ESTIMATING THE OPERATING AND SUPPORT COST DIFFERENCE AMONG TUAFF C-130E, C-130B AND USAF C-130J AIRCRAFT

I. Introduction

Chapter Overview

This thesis will compare the operating and the support cost (O&S Cost) of the C-130E, C-130B and the C-130J Hercules aircraft. This chapter includes the background, problem statement, and investigative questions; as well as the scope of the research, and its limitations.

The purpose of this research will be to establish a model for estimating the O&S cost for the aircraft in the Turkish Air Force (TUAFF). By applying this model to the USAF C-130s, the relative O&S cost of the C-130E, C-130B and C-130J will be found. By making the analogy, the best decision for keeping and refurbishing C-130s already in the TUAFF or replacing them with the C-130J will be investigated. The recommendations will be presented at the end of the thesis.

Background

In the TUAFF C-130s have been used not only for Tactical but also for Strategic Air Lift purposes. There is just one airlift base that accommodates the C-130s in Turkey. The TUAFF has been using 6 C-130B since 1981 and 7 C-130E since 1961 for personnel carrier, fire extinguishing, and cargo. C-130s have been used for channel missions that

are programmed two times a week in order to carry the material shipments between the Turkish borders, and to carry materials overseas because of its ability to go further when we compare with the other airlift aircraft, the C-160s and CN-235s.

Changing world situations give armed forces different roles, and Turkey participates in all peacekeeping missions that are assigned by NATO (North Atlantic Treaty Organization) and the United Nations. While performing these roles, the importance of air mobility and the importance of reliability became widely appreciated. Moreover, the coming retiring age of the existing C-130s in the TAAF forced the TAAF to look for ways to improve its air mobility. In 1995, Turkish Aircraft Industry (TAI) started to produce the CN-235 aircraft with the help of the Spanish CASA firm. However, the problems faced with this aircraft and the capacity problems showed that this aircraft is not the one that is required by the TAAF. In addition to this, while C-130s are performing their missions, there can be unexpected problems that cannot be fixed by the aircraft crew and the maintenance crew of that base, in addition to these they might not even recognize the problem. At those times, the main C-130 base has to provide a maintenance crew and prepare the supply kit according to the illustrations taken from aircraft indicators. The mission sometimes has to be performed by another aircraft; or sometimes, the crew returns to the base and takes the correct materials to fix the aircraft. This causes not only delays in the mission of that aircraft but can also affect the missions of the other bases.

Under these conditions the TAAF is trying to find a way to decrease these interruptions in the missions and to increase the capability of carrying more personnel

and materials so as to increase the effectiveness of Air Lift missions. There are two ways to accomplish this target:

1. Refurbish the existing C-130s and increasing its reliability.
2. Buy the newest version of C-130 Hercules, the C-130J

In the DOD acquisition process, a basic contract process is called the Firm Fixed Price Incentive. In this process, whichever company offers the lowest bid gets the contract, but this does not necessarily mean that it will provide the “best value.” If the requirements are not defined clearly, the low bid winning process will cause lots of problems in proceeding stages of the contract. Fabricky and Blanchard define the best value item as “all other factors remaining equal, people will meet their needs by procuring goods and services that offer the highest value/cost ratio” (13:5).

Under these circumstances, the TUAf wants to know what trade-offs are associated with the cost and performance of the contract, and which one of the alternatives would be best in terms of cost and performance to maintain the TUAf’s lifting capability.

Problem Statement and Contribution of Research

All the bases in the TUAf are connected to each other by fiber optic lines in order to answer the supply demands, and the only way to carry the materials demanded from one base to another is using either C-130s or C-160s. If the aircraft do not work properly, it does not matter if you have the most advanced supply-demand system. Having understood the current situation, the TUAf realizes that the old age of the existing aircraft require them to be refurbished or replaced by C-130Js.

These C-130s are the main body of the TUAf airlift groups. Since they are used frequently and their missions are various, their operating hours are high. This causes frequent failures, so every year the money spent to maintain them is increasing. However, because of the declining Defense Budget, the TUAf wants to make the best decision about keeping the existing C-130s and refurbishing them or buying the C-130J.

Research Question

The TUAf needs to know what cost-tradeoffs are involved in the replacement decision. To determine the trade-offs, the relative O&S cost of the C-130E, C-130B, and C-130J are needed. In order to reach the correct conclusion about the trade-offs, the following investigative questions have to be answered.

Investigative Questions

1. What are the relevant costs to compare?

Since TUAf has already been operating C-130E and C-130Bs, the procurement costs of the aircraft are considered to be sunk. The O&S cost is therefore the most significant cost in system or product life cycle. That is why O&S cost (labor costs of operating and maintenance personnel, fuel and power cost, operating and maintenance supply costs, spare and repair part costs, and related overhead costs) will be considered to be valid for the cost aspect of this comparison.

2. What is the best way to compare these costs?

Since C-130Js have been used in the USAf for only a few years, it is considered to be in the initial transient stage according to the bathtub effect; on the other hand, the C-130E and C-130B are supposed to be in steady state or wear-out stage. The comparison

of the costs will be most useful if they are evaluated over years in order to give better idea to the decision makers to make their decision more accurate over long run.

3. What data would be needed to perform the comparison?

Maintenance plans, operating hours, man-hours needed to prepare and operate the aircraft, and maintenance and supply records would be needed to perform this analysis.

As much as possible, data will be provided by the TUAF especially the data related to the operation of the aircraft. The maintenance and the supply data will be provided from US sources, and then a comparison will be made in order to reach a more accurate result.

4. What additional non-cost factors would need to be considered?

Since the USA is one of the most important allied countries for Turkey, political factors are considered to be irrelevant for this thesis. Because of the declining budget and the role of the TUAF on the region and the peacekeeping missions, the performance and the cost are deemed to be the relevant factors that would be considered.

5. What recommendation should be made to the TUAF?

After analyzing the alternatives in terms of performance and cost, the most suitable alternative will be addressed to be considered while making decision. It should not be forgotten that LCC analysis would not be the final result for the decision makers. This will be one of the most important inputs for the decision makers while reaching the conclusion about the alternatives.

6. What trade-offs exist in the decision?

Capacity, speed, range, landing range and the cost are considered to be the main trade-offs in the decision. Additional factors will be considered and presented as required by the analysis.

After looking at the investigative questions, we have to address the sources of data to answer these questions.

Data Sources and Analysis

This research will estimate the O&S cost difference between the C-130E, C-130B and C-130J. As much as possible, data will be provided by TUAFF (especially the data related to the operation of the aircraft). The maintenance and the supply data will be provided from US sources, and then a comparison will be made in order to reach a more accurate result. USAF cost information and Life Cycle Cost methodologies will be employed. When the data are not sufficient, secondary data will be employed. The specifications of the C-130E, C-130B and C-130J will be acquired from different publicly available sources. For question 1, 2, 3, 4, 5 and 6 the data will be provided from the US and TUAFF archives, and the information available publicly will be evaluated by employing the suitable methodology that is being used in US Air Force.

Scope and Limitations

The purpose of this research is to estimate the cost differences between Turkish C-130E, C-130B and USAF C-130J's O&S cost in order to evaluate the cost aspect of the alternatives. It is not being established as a model that can be used for other systems and products, because of their different maintenance systems.

This research is not performed to find the absolute best alternative; here it is just aimed to show the O&S cost differences and analyze trade-offs. In the final analysis, the decisions on keeping and refurbishing the existed aircraft or buying the C-130J are up to

decision makers. The purpose of this effort is to provide an analysis of one key part of that decision; the O&S costs.

US dollars will be used as a currency because of their stability. Almost all of the spare parts of the C-130s are provided from the USA, that is why it is the most suitable way to use US dollars as a currency in the all over analysis.

Research Assumptions

All the data provided for the US C-130E and C-130B are also valid for the TUAF C-130E and C-130B. Since they are the same brand and manufactured by the same manufacturer, and their maintenance implementations are the same, they can be considered to yield the same or similar result.

All US cost information associated with this analysis are accurate. Most of the parts of the aircraft are supplied from US. The costs of rest of the parts produced in Turkey are not significant statistically.

The US LCC analysis methodology is accurate and reliable, and appropriate for this study.

Summary and Research Organization

This thesis consists of five chapters. In Chapter I, the basic problem was introduced with background that addresses the current situation and the purpose of this thesis. The problem statement and contribution of research that describes the main problem that push TUAF to this research, research and investigative questions that have to be answered to reach a conclusion, scope and limitations that is the border of the

thesis, and the assumptions that have to be made to solve this problem analytically were presented.

Chapter II presents a Literature Review that consists of descriptions of the concepts and some of the answers to the questions raised in Chapter I. Chapter III describes the research methodology of this thesis. Chapter IV will present results. Chapter V will present the recommendations based on the qualitative and quantitative analysis that shows the trade-offs between the C-130 alternatives.

II. Literature Review

Chapter Overview

The purpose of this chapter is to review the literature to compare the performance of the various C-130 types that are the subject of this research. In addition, this chapter will provide insight into the process of Life Cycle Costing (LCC), the cost elements that will be considered while employing the analysis, the LCC methods, and the Cost Breakdown Structure of the typical system. This review will serve as the basic foundation to understand the LCC process and choose the proper method for execution of the analysis. There are five basic parts to this chapter.

In the first part of this chapter, the performance comparison of the C-130 E/B and J are presented. While presenting the performance comparison, the avionic features will be presented as well. In the second part of this chapter, the concept of economic life will be presented. Obsolescence and deterioration will be explained as well as the concept of the “bathtub curve.” The third part of this chapter will present information about LCC and its benefits. The fourth part of this chapter explains cost classifications, so as to understand the cost types and major cost classifications as well as the Cost Breakdown Structure. In the last part of this chapter, cost estimating methods will be explained, and the situations in which they should be used will be presented.

C-130 B/E/J

The C-130 Hercules primarily performs the tactical portion of the airlift mission. The aircraft is capable of operating from rough, dirt strips and is the prime transport for

air dropping troops and equipment into hostile areas (11:1). Basic and specialized versions of the aircraft perform a diverse number of roles, including airlift support, Arctic resupply, aeromedical missions, aerial spray missions, fire-fighting duties for the U.S. Forest Service, and natural disaster relief missions (7:1). The flexible design of the Hercules enables it to be configured for many different missions. The C-130 can be rapidly reconfigured for various types of cargo such as palletized equipment, floor loaded material, airdrop platforms, container delivery system bundles, vehicles and personnel or aeromedical evacuation (11:2).

The C-130B variant introduced the use of the Allison T56-A-7 turboprops and the first of 134 entered Air Force service in May 1959 (7:2). The C-130E version uses the same Allison T56-A-7 engine, but added two 1,290 gallon external fuel tanks and an increased maximum takeoff weight capability (11:3). Other differences between the E and B variants are as described below:

Maximum ramp weight of the C-130E soared to 155,00 lbs., an increase of 20,000 lbs. over the "B". Its fuel capacity was increased by over 17,000 lbs. All of this weight addition required extensive strengthening of the basic airframe, especially in the area of the wings and landing gear. More powerful Allison T-56-A-7A engines of 4050 hp were used and a pair of external tanks. (8:1)

The C-130J is the latest addition to the C-130 fleet and will eventually begin to replace retiring C-130E's and C-130H's. The C-130J incorporates state-of-the-art technology to reduce manpower requirements, lower operating and support costs, and provides LCC savings over earlier C-130 models (7:2).

When we compare the C-130J to the earlier versions of the C-130s, the C-130J climbs faster and higher, flies farther at a higher cruise speed, and takes off and lands in a

shorter distance. The major improvements that distinguish C-130 J from C-130's early versions are:

- Advanced two-pilot flight station with fully integrated digital avionics
- Color multifunctional liquid crystal displays and head-up displays
- State-of-the-art navigation systems with dual inertial navigation and global positioning systems
- Mission planning system
- Low power color radar
- Digital moving map display
- New turboprop engines with six bladed, all composite propellers
- Digital auto pilot
- Improved fuel, environmental and ice protection systems. (7:2-3)

A new propulsion system provides the C-130J 29% more thrust, while increasing fuel efficiency by 15% with four Rolls-Royce AE2100D3 engines (9:3). The new C-130J has the same silhouette with the earlier version of C-130s, but in fact it's a brand new airplane with respect to performance. When we compare the C-130J with the earlier production C-130E, maximum speed is up 21%, climb time is down 50%, cruising altitude is 40% higher, and range 40% longer. The C-130J variant includes new engines and new props (9:2).

It also has superiority from the point of view of avionics. For difficult low altitude maneuvers, new avionics and dual head-up displays make it easier and safer to operate. It also offers reduced manpower requirements, lower O&S costs and LCC. It is equipped with four head-down Liquid Crystal Display (LCD) instruments for aircraft flight control, navigation and operating systems, and two holographic head-up displays. The displays are compatible to night vision imaging system and enable the aircrew operate in total darkness with special night vision devices in special operations (9:3).

Concept of Economic Life

In ideal conditions, once the system is produced and operations begin, it is expected to be useful forever. This is not true in reality. Because of the deterioration and obsolescence of the systems or products, their useful life is limited.

The economic life can be defined as the period of time that will elapse before the equipment is displaced from intended service by more economic equipment. Economic life is the period over which the equipment will continue to have the lowest annual cost compared to any contender for the service. It implies that the period will end with the appearance of equipment having lower annual cost (24:85). The causes behind the system replacement decision are deterioration and obsolescence.

Factors determining obsolescence

Obsolescence describes that the situations where the technological life of the system is about to be terminated, not by deterioration but by the fact that technological advances make necessary the replacement with up-to-date equipment. This replacement sometimes can be unfeasible. The machine's obsolescence can be determined by comparing its operating cost when new with the operating cost of the latest replacement model.

The following aspects illustrate some cost differences resulting from technological inferiority in design:

- Higher fuel and power consumption because of lower design efficiency
- Lower productivity because of lower productive speeds
- Higher maintenance and repair due to inferior design plans
- More breakdowns from design weakness
- Less reliability because of poorer design calculations

- Greater spoilage from less accurate design
- More labor and supervision because design is not as highly automated
- More floor space from less compact design. (24:190-191)

Obsolescence is the result of technological advancements. As the newer systems appear the old system becomes obsolete. Generally, the newer system demonstrates the state of the art technology with its size, efficiency and the effectiveness. In many cases, keeping the obsolete system is not a feasible alternative in terms of operating costs, especially when the first investment is not very high. The newer systems are desirable, because of their increased capability, speed and the lower energy consumption. On the other hand, if the old systems investments do not justify the replacement, in other words high first investment cost, upgrading, or refurbishing sometimes can be the feasible alternative.

The other concept that dictates the refurbishing or replacement decision is deterioration.

Factors determining deterioration

“Deterioration can be defined as the lowering of the engineering efficiency of equipment compared to that existing when the equipment was new” (24:190).

Deterioration is related to the age of the system. As the system gets older, it requires more preventive and corrective maintenance. In addition to this, the efficiency of the system also decreases. This causes increases in operating and support cost. Taylor indicates some cost aspects related to the deterioration of the system:

- Increased fuel and power caused by lower machine efficiency
- Increased maintenance and repair due to failure of parts
- Increased labor idle time due to increased frequency of breakdowns
- Increased spoilage and increased labor and material wastage due to unreliability

- Increased labor due to reduced speed and lower productivity
- Increased inspection costs due to loss of reliability
- Increased overhead due to unreliable equipment (24:190-191)

Deterioration is different from obsolescence. While obsolescence is related to the emerging technologies, the deterioration is related to the age of the system. It indicates increases in supporting cost in terms of maintenance, also the operating cost from the point of view of decreasing efficiency.

The bathtub curve can show the effect of time or age to the reliability of system.

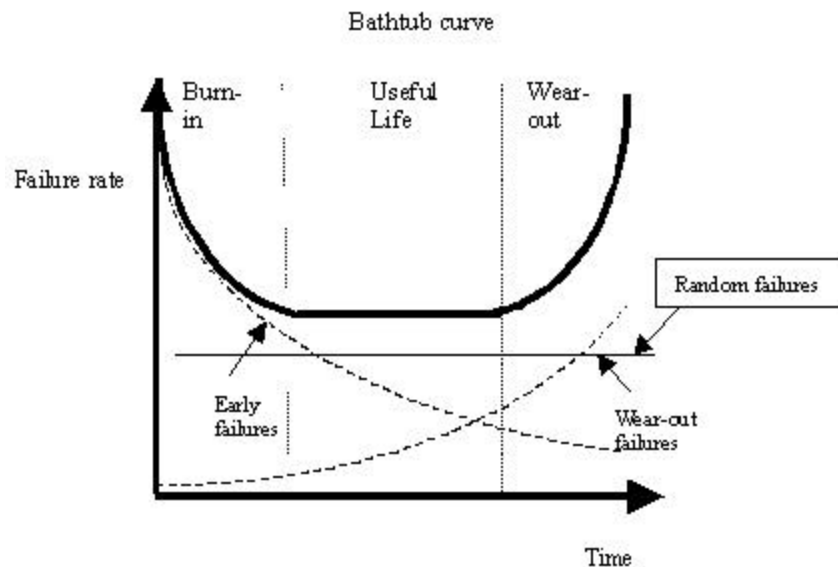


Figure II.1. Bathtub Curve (1:13)

Bathtub Curve

The bathtub curve shows us that a system near the end of its useful life will incur increasing maintenance cost while its reliability is decreasing. The bathtub effect takes its name from the shape of the graph of failure rate against the system age.

In the burn-in period of the system life, the failure rate starts high due to design problems or manufacturing defects such as: welding flaws, cracks, defective parts, poor

quality control, and poor workmanship. This early failure decreases as these problems are fixed (1:12). In this period, testing, quality control, screening and acceptance testing can decrease the failure rate (12:32).

As the system matures, the failure rate becomes nearly constant during a useful life period. In this period, the reasons for the failures in the system can be environment, random loads, chance factor, and human error. Designing in excess strength can reduce the failure rate (12:32).

As the equipment ages, the failure rate starts increasing because of fatigue, corrosion, friction, cyclical loading, wear out, and old age of the system (12:31;3:355). In this period, the failure rate can be decreased by preventive maintenance, replacement of parts, and refurbishing (12:32).

Obsolescence and deterioration are the two main factors that determine the economic life of the system. Especially in a high threat environment, all armed forces want to dominate their rivals with the technology. Obsolescence can occur anytime. In a dynamic environment, upgrading or replacing the former version of the system is the alternative for this situation. However, deterioration is related to the age of the system. As shown in the bathtub curve, as the system gets older, the failure rate increases, and preventive maintenance, replacement of parts, and refurbishing is the ways to decrease the failure rate. The bathtub curve also shows us that in initial stage of the system the failure rate starts high, then decreases as manufacturing defects are fixed until it reaches steady state condition in terms of failure rate, and finally as the system gets older, the failure rate increases.

Life Cycle Cost Analysis (LCC Analysis)

The life cycle of a product or system is the entire life starting from design through disposal. All cost associated with this cycle is the Life Cycle Cost (LCC). The LCC of a decision (or system) is the variable cost associated with the decision (or system). If the decision is to proceed with an alternative, then the difference between total costs with and without the alternative (or any other) is the LCC (19:3). Declining military budgets motivate military organizations to make the correct decision, and selecting the best value item. Determining the best value item requires balancing performance (speed, payload, MTBF), schedule (Initial Operating Capability, production rate), supportability (mean time to repair, maintenance manpower), and cost (acquisition, operating, support) (20:28-30). Benson categorizes the benefits of LCC analysis as:

- Justify for "spend to save" decisions.
- Enables to compare competing systems.
- Evaluation of alternative systems.
- Enable decisions to be better informed.
- Monitoring a program or process effectively.
- Performance and cost trade-off decisions. (3:3)

Seldon provides a similar list of benefits:

- Long-range planning and budgeting: LCC aims to reach more detail for planning purposes and a quantitative basis for the total budget.
- Comparison of competing programs: LCC analysis gives opportunity to the analyst to compare the costs of alternatives that meet the operational requirements.
- Comparison of logistic concepts: The cost comparisons of various logistic support concepts of a system can be evaluated for the entire life cycle.
- Decisions about the replacement of aging equipment: Cost analysis shows the facts about the importance of replacement of the aging equipment.
- Control over an ongoing program: LCC can be used as a decision criterion as the program progresses; decisions must be made regarding the LCC.
- Selection among competing contractors: It is also the criteria in source selection, especially in DOD acquisition process. (22:11-12)

The life cycle is the entire life of a system from design to disposal and the money incurred for the system in its entire life cycle is called the LCC. Seldon and Benson point out that the LCC analysis is useful for evaluating alternatives from the point of view of cost, providing insight about the cost of the product to be manufactured, giving opportunity to the managers to monitor the program effectively, and showing the trade-offs to the manager in terms of cost and performance.

Sensitivity Analysis

While performing LCC analysis, the analyst might use some uncertain data, due to “inadequate input data, initial assumptions, pushing the state of the art, or any combination of these factors” (5:96). In these cases, the analyst has to employ sensitivity analysis in order to evaluate how the result would change based on the inputs. He has to estimate the result of changes in the parameters. The analyst has to evaluate the risk and uncertainty when decisions are made according to the result taken from the analysis.

While applying the sensitivity analysis, the analyst changes some uncertain parameters in order to find in which range the solution justifies the decision made. This analysis is important to reducing risk.

Decision makers are typically interested in the full range of possible outcomes that would result from variances in estimates. Sensitivity analysis, when used as part of a LCC analysis, allows us to determine how sensitive final results are to changes in the values of estimates (13:180).

Cost Drivers

In LCC analysis, there are often too many details that cannot be assessed. That is why the analyst should focus on the important areas in order to reach the best conclusion.

To determine the trade-offs, the cost drivers must be known. Cost drivers are “those activities that cause the incurrence of costs” (23:21). “Pareto’s law” states that most of the costs of a product are concentrated on a few parts of that product (22:197). If the analyst concentrates on the few significant cost drivers, an efficient LCC program is possible.

According to Seldon there are some common sense, general ideas for the system and process costs:

- New development are expensive
- Tight schedules are more expensive than a relaxed pace, though too leisurely a schedule is also costly.
- Manpower requirements during the O&S phase are cost generators.
- Any requirement that increases the total force needed to meet the user’s specifications is a cost driver. (22:198-199)

The analyst should list the significant cost drivers before performing a LCC analysis. In the production phase, as the process goes further, the detail for the cost drivers can be better defined to reach a more precise LCC estimate.

Some Classifications of Cost

While dealing with LCC, one of the most important tasks is defining the types of costs accurately. There are several types of costs associated with LCC. Some of them will not be considered to be important, depending upon the type of decision. The analyst must include all appropriate types of costs in his list to make an accurate estimate and provide correct data to the decision maker.

Sunk Cost

The portion of cost that is not recoverable (10:28). This is the cost already incurred or which cannot be recovered by any action. A sunk cost is “one that cannot be recovered or altered by future action and is therefore irrelevant” (13:27). Edwards and Black define sunk cost as “cost of resources already acquired and will remain unchanged by any choice between alternatives” (4:47). LCC analysis searches for the best alternative by looking at the future costs of the alternative systems. Because of this, sunk cost is not relevant for LCC analysis. For example, the depreciation on a piece of production machinery will have no effect on a decision with respect to replacing that machine. In addition to this, cost of a specialized warehouse for the new system built is also sunk and cannot be recovered even if the procurement of the new system would be canceled.

Investment Cost

It is the cost of acquiring the system or capability that cannot be recovered after the project starts. For purchased equipment, these include the purchase price plus shipping cost, installation cost, and training cost. For fabricated systems, structures, or items of equipment, they include engineering, design, and development costs, test and evaluation cost, and construction or production costs as well as shipping, installation and training costs (13:22).

Fixed Cost

A cost that does not vary in the short run. Fixed cost is ordinarily defined as that group of costs involved in a going activity whose total will remain relatively constant throughout the range of operational activity (13:23).

Charlton and Perloff define fixed cost as “costs that do not vary with the level of output” (10:28). Fixed costs are made up of such cost items as depreciation, maintenance, taxes, insurance, lease rentals, interest on invested capital, sales programs, certain administrative expenses, and research (13:23).

Variable Cost

A cost that changes with the level of output. For example, the consumption of fuel or raw material for a production process. These costs change according to the number of units produced. These costs may include direct and indirect costs. (6:2-3)

Direct Cost

The costs of the basic elements of the system, this cost is the most perceived cost while operating or producing the system. Examples could be fuel, oil, and wages of the personnel and raw material. This is the cost that can be traced in the production process. Direct cost is usually categorized as direct labor and direct material. Direct materials include those materials which can be specifically identified with a product; direct labor includes that human effort which can be traced directly to the manufacture of the specific product.

Indirect Cost

The cost elements that are not directly related to the operating utilization of the system, that is why it is difficult to evaluate this cost. Indirect cost include items such as social security payments, group insurance, holidays and sick pay, hangar lighting (13:25; 6:2-3). This is the element of cost that is not directly traceable to a specific product (4:45). Other indirect cost categories include indirect labor, indirect material, and generated administrative costs.

Cost Breakdown Structure

A Cost Breakdown Structure (CBS) links objectives and activities with resources, and constitutes a logical subdivision of cost by functional activity area, major element of a system, and/or one or more discrete classes of common or like items. A CBS is usually adapted or tailored to meet the needs of each individual program (5:33). It is a systematic approach to break down the cost into logical, traceable subdivisions at lower and lower levels of detail. The CBS should exhibit the following characteristics:

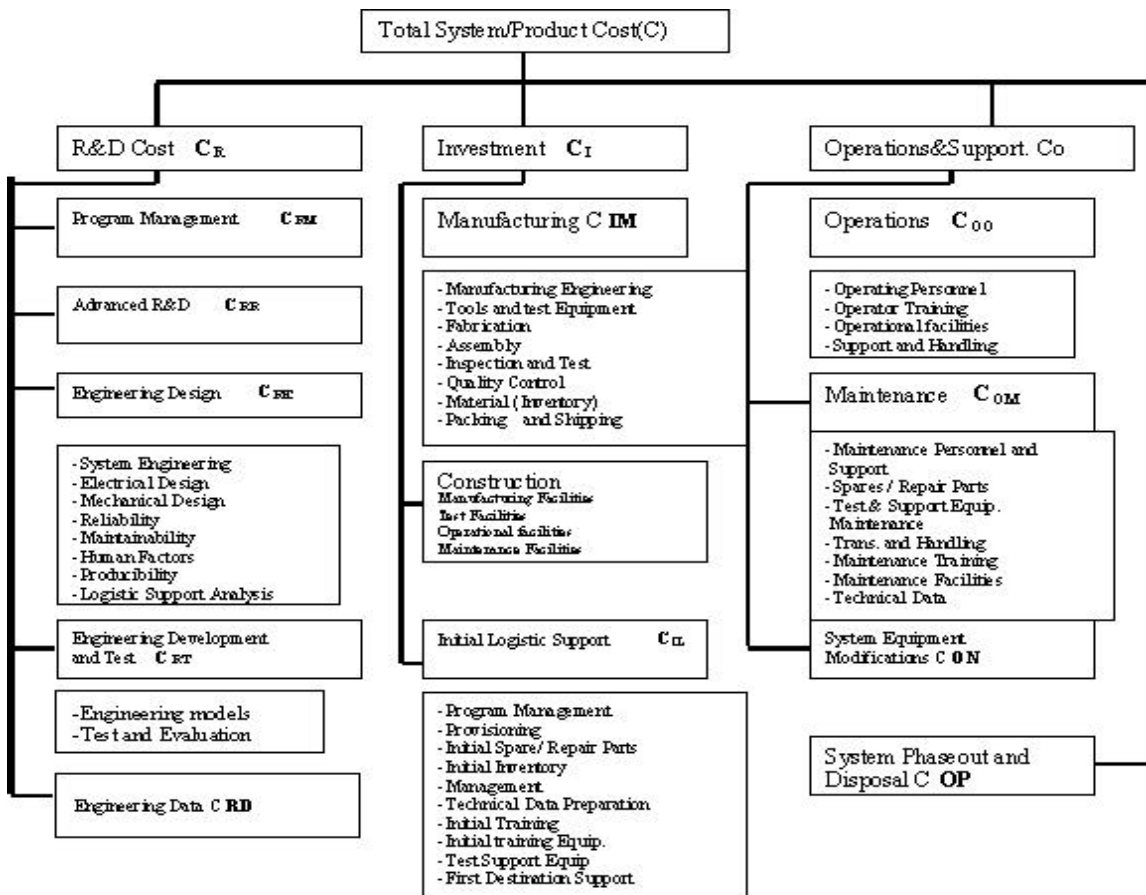


Figure II.2. Sample Cost Breakdown Structure (13:333)

- All costs should be considered and identified in the cost breakdown structure.
- All cost categories should be well defined; there should not be any doubling or omissions.

- Cost must be broken down to the depth necessary to provide management the sensitivity required in evaluating system design, production and operations.
- Cost Breakdown Structure should be designed according to the analysis objectives.
- The CBS and the categories should be coded so as to be separated easily.
- The CBS should be directly compatible with planning documentation, the work breakdown structure, work packages, the organization structure, PERT/CPM, and so on. (5:33)

In this section we reviewed the cost classifications in order to have insight about cost types in LCC analysis. In addition to this, the CBS was presented as a systematic approach to break down the cost into traceable subdivisions in order to include all major cost drivers that affect the LCC of a system. CBS is the most important step of the LCC analysis. This structure provides the opportunity to trace and evaluate the cost. The major cost types (sunk cost, investment cost, fixed cost, variable cost, direct and indirect cost) were also discussed.

Program Costs Over Time

A major weapon system program can be divided into two major time periods: Acquisition and Utilization. The acquisition period starts with an identification of the need of the users, and then progresses by phases through conceptual design, detailed design development, and production. After production, the utilization period starts that includes operating support and disposal of the system (13:2-3).

Acquisition Period

When the need is identified, these are stated by the operational commanders. If the need must be served by new equipment, the acquisition period starts. The first phase of the acquisition period is research and development, which includes conceptual design and detailed design/development. In conceptual design, key activities that have to be

completed are market research and analysis, selecting the preferred alternative, developing the initial acquisition strategy, and preparing the LCC estimate. In detailed design, the appropriate subsystems of the system have to be determined. A primary goal is risk reduction. When the “system architecture” is developed, the production phase starts (2:3). This phase includes activities such as selecting the manufacturing requirements, establishment of work methods, manufacturing, quality control, and determining initial logistic support requirements (initial consumer support, spare/repair parts, test and support equipment, technical data, and training) (6:11-12; 13:3). Costs are associated with each of the phases in the acquisition period, and will be discussed below.

Research and Development Cost: This is the cost which is incurred in the first phase of the product life cycle, and it is estimated that 10% of the product or system LCC is incurred in this phase for a typical aircraft (15:3). The proportion of LCC in each category varies greatly by type of system: aircraft versus missiles versus ships, etc. This is the cost incurred during the concept, demonstration, and validation, and full-scale development phases of the acquisition process (16:170).

Research and development (R&D) cost include all of the expenses necessary to produce a set of engineering drawings and specifications for release to manufacturing; this covers the conceptual, validation, and full-scale development phases. It also includes systems engineering studies, design, development, testing, prototype fabrication and testing pilot line fabrication, operations and support planning, and manufacturing planning. (22:21)

In this phase, all the costs incurred to justify the design, analysis of the alternatives and demonstrate feasibility works to put the project into production phase are

considered as research and development cost.

Production Cost: This is the cost incurred in the second phase of the product Life Cycle. Production cost is estimated as 30% of the total system LCC for a typical aircraft (15:3). This includes industrial engineering and operation analysis, process development, facility construction, and manufacturing (fabrication, assembly, and test of operational systems), quality control, operation and maintenance of the production capability, and initial logistic support requirements (initial consumer support, spare/repair parts, test and support equipment, technical data, and training) (6:11-12).

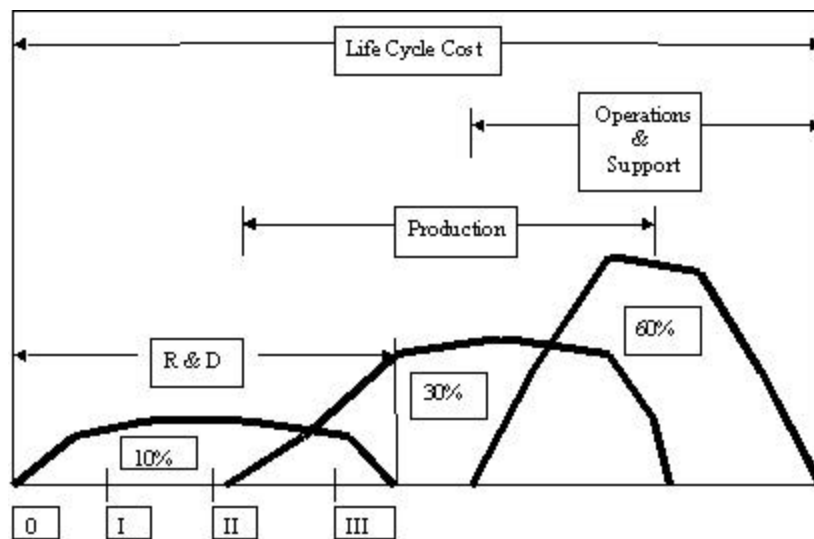


Figure II.3. System Life Cycle Milestones (15:3)

This cost is considered to include the initial customer costs, such as personnel training, testing, transportation, and facilities (22:43). Production actually begins from the point where system design is considered fixed and includes total flow of materials, from the acquisition of the raw materials to the delivery of the finished product (13:10).

Production cost includes all cost associated with the production of the system such as labor, material, quality control, test and support equipments, data and training. After the production phase the system is delivered to system users for operation.

Utilization Period

In the utilization period, we incur costs associated with the operation, support and disposal of the system. In the operation and support phase, the system is distributed and started to be used. Modifications and maintenance activities are in progress. In the disposal phase of the system, system can either be disposed of, or recycled. Costs are associated with each of the phases in the utilization period, and will be discussed below.

Operation and Support Cost: These costs are incurred from the beginning of operation and continue to be incurred through the useful life of the systems until disposal. This is also called ownership cost. For a typical aircraft, it consumes the 60% of the system LCC (15:3). This cost includes the labor costs of operating and maintenance personnel, fuel and power cost, operating and maintenance supply costs, spare and repair part costs, costs for insurance and taxes, and overhead costs (13:22). Kankey points out that not all decisions generate all categories of LCC. He further notes that average percentages by Life Cycle phase vary by type of system (aircraft, missile, electronic), and on a case-by case basis (19:1).

Disposal Cost

This is the cost incurred in the disposal phase of the system Life Cycle. This cost is usually relatively small, but if the system is explosive, nuclear, or uses harmful chemical or biological product, the disposal cost can be high. Such cost may have a significant impact on the predicted LCC (16:173).

Summary of Program Costs

A major weapon system program can be divided into two major time periods: Acquisition and Utilization. The acquisition period includes research and development and production phases, while the utilization period includes the operations, support and disposal phases.

There are four major cost areas in system LCC. These begin with research and development costs which are incurred in the first phase of the acquisition and utilization of the system, including conceptual and detailed design. Next are production costs that are incurred to manufacture the system and all related cost to produce the system. Operation and support costs are incurred next and include operators, energy, fuel, support personnel and the material cost for maintenance. Finally we face disposal costs which are incurred to dispose of the system at the end of its useful life.

Cost Estimating Methods

A cost estimate is an opinion based on analysis and judgment of the cost of a product, system or structure. This opinion may be arrived at in either a formal or an informal manner by several methods, all of which assume that experience is a good basis for predicting the future. In many cases the relationship between past experience and future outcome is fairly direct and obvious; in other cases it is unclear, because the proposed product or system differs in some significant way from its predecessors. The challenge is to project from the known to the unknown by using experience with existing entities. “The techniques used for cost estimating range from intuition at one extreme to detailed mathematical analysis at the other” (13: 144-145).

There are four basic methods for cost estimating: Analogy Method, Parametric Method, Engineering Method, and Expert Opinion. Each of the four basic methods of estimating is effective for research and development costs. Expert opinion is more subjective and requires less data. Analogy is the easiest and is usually used early in the program. If more information and preparatory work are available, parametric methods can be used. Later in the program, when detailed, specific tasks are known and increased accuracy is desired, and it is worth spending the time and money to develop such estimates, an engineering estimate should be used (22:23).

Analogy Method

This method estimates the cost of the new system or product by looking at previous similar systems' cost. While estimating the new system cost the differences have to be evaluated and adjustments have to be applied, so as to reach a more accurate result. Especially in the early stage of the product or system, when the firm is entering into a new activity, estimating by analogy can be used effectively, and appropriate adjustments have to be made for differences "in size, number, performance, complexity, schedule, and advancements in the state of the art" (13:146;22:23). Judgment is very important for the accuracy of the estimation with this method. This method is fairly easy and quick.

Parametric Method

In this method, the analyst tries to find a functional relationship between changes in costs and the factor or factors upon which the cost depends (such as output rate, weight, lot size) by using statistical techniques (13:147).

These methods assume that one or more parameters of the program explain the

cost. This method can be simple mathematical model or complex statistical formulas. For example, the cost of the fuel consumed by the aircraft can be computed by using the hours flown by the aircraft. Assuming that fuel is consumed by any one aircraft at the same rate per hour, total fuel cost can be predicted using:

$$FC = N * FH * CR * C \quad (1)$$

where,

FC: Fuel Cost (dollars)

N: number of aircraft

FH: flying hrs per aircraft (hours)

CR: fuel consumption per hour (gallons)

C: cost of the fuel/gallon (dollars)

Many times, more than one cause is responsible for the cost. In that case, the cost estimating method must use more than one independent variable (cost driver) to determine the total cost. In this instance, regression analysis is utilized to determine the relationship between the variables. (23: 23)

Engineering Method

This is the method, which is generally the most costly, detailed, time consuming and accurate. The analyst has to determine each part of the system and show all the lowest detail in his cost breakdown structure and assign the cost to them.

The engineering estimator begins with a complete design and specifies each production or construction task, equipment, and tool need and material requirement. Costs are assigned to each element at the lowest level of detail. These are then combined into a total for the product and system. (13:145)

This method is not feasible for the most complex systems. It requires more hours of effort and data. However, it is hard to find the detailed data for the complex systems. This may cause strange results when we combine the cost of detailed data estimates; the cost of the whole often becomes greater than the sum of the cost of the parts. (13:145)

Expert Opinion

In this method, the cost of the new system or product is estimated by consulting with experts who have experience with similar projects. The strength of this method is that the expert can take the exceptional characteristics of the new system into account, and integrate his or her past experiences with the new techniques and applications for the future projects. On the other hand, the weakness of this method is that the quality of the estimate will be highly dependent on the expert's judgment, which can be biased, optimistic or pessimistic with respect to the system (17:3).

An expert-consensus mechanism such as the Delphi technique may be used to produce the estimate. In the Delphi technique, experts are asked questions which they answer independently and anonymously. In this way, they are answering the questions without being affected the other's ideas. They independently provide numerical estimates, which are gathered and analyzed statistically. The experts who provided estimates outside the middle two quartiles are asked to provide justification for their response, which is shared anonymously with the other experts. This process continues for several iterations, and the responses will eventually seek consensus. This method is somewhat labor intensive, expensive and time consuming (14:262-263).

This method is often used in combination with the other LCC estimation techniques. For example, expert opinion is used with the analogy method for quantifying

the relationships between the new and the old systems (17:3). It is also used in parametric method to identify the cost drivers and to specify the expected cost functions (17:4).

It should be noted that a larger problem (system) could often be broken into smaller problems (systems). Different techniques can be used on the smaller pieces. Analogy on some, parametric where appropriate, engineering methods where the data is highly valued, and the expert opinion can be used where the data is unavailable.

Breakeven Analysis

A breakeven analysis should be accomplished prior to arriving at a final decision in connection with the selection of a preferred approach (5:62-63). When we evaluate the alternatives to be selected for procurement from the operation and support cost standpoint, by looking at the LCC of the alternatives we might select one alternative which is not favorable in the long term. That is why breakeven analysis has to be employed in order to make the assessment of which alternative would be best over different time spans.

In the evaluation of the alternatives, breakeven analysis shows us which alternative would be favorable and when. After breakeven analysis, we can choose the alternative according to the organizational strategy and the financial opportunities we have. It would be desirable to see the cumulative cost of the alternatives over the years in order to reach a conclusion about the alternatives. The total cost would depend on the time horizon that the systems would be used by the organization. If the systems are considered to be employed for a long time period, the selection decision would favor

longer-term cost savings over short term costs.

Breakeven analysis can also serve to compare the risk and cost evaluation of the systems. For instance, if the total life cycle costs of the systems are not significantly different in the long run, it can be decided to choose the expensive system in order to avoid the risk of the cheaper system. Breakeven Analysis is the essential technique to determine the favorable alternative.

Summary

This literature review presented the performance features of the C-130E/B and J model aircraft. Then, basic concepts related to LCC analysis and the cost factors relevant for weapon system acquisition and utilization were presented as well.

This chapter noted that the C-130J is the latest version of the C-130s, and it is equipped with the state-of-the-art technology that enables it to climb faster and higher, and to land and take off in a short distance. Moreover, it is more fuel-efficient, and flies farther, when we compare it with the earlier versions of the C-130s.

The concept of economic life was explained, and obsolescence and deterioration were noted as factors that determine the economic life of a system. Obsolescence occurs as a result of environmental or technological changes. Deterioration is related to the age of the system, as reflected in the bathtub curve. As the system gets older, the failure rate increases, and preventive maintenance, replacement of parts, and refurbishing are the ways to decrease the failure rate.

In the third part of the chapter, the LCC concept and its benefits are explained. Life cycle is the entire life of a system from design to disposal and the money incurred

for the system in its entire life cycle called LCC. LCC Analysis is useful for evaluating the alternatives from the point of view of cost, providing insight about the total system cost.

Finally, the cost classifications are explained and related to the phases of purchasing and operating major systems. These costs include the research and development cost, production cost, operation and support cost, and disposal cost.

Cost estimating methods were presented, and characteristics indicating their use were discussed. Analogy, parametric, the engineering, and expert opinion were the four methods discussed.

In the next chapter, the methodology to be used in this research will be presented and described.

III. Methodology

Chapter Overview

This chapter explains the process that will be used to meet the objectives of this research. The Literature Review presented the performance of the various C-130 types, LCC, cost elements of the LCC methods, and the Cost Breakdown Structure of the typical system. This chapter discusses the needed C-130 O&S cost elements, the data collection process, and the LCC method that will be employed. It includes the research objectives, research design and implementation, expected results and scope and limitations.

Research Objectives

The C-130s are the main body of the Turkish Air Lift group, but their operation and support cost is constantly increasing due to their age. Because of this reason, the TUAf needs to find a way to decrease their O&S cost and increase the effectiveness of the Air Lift group. In this case there are two alternatives to be evaluated:

1. Refurbishing the existing C-130s.
2. Buying the newest version of C-130s and replacing the existing C-130s.

The TUAf does not have O&S cost estimates for the C-130E, C-130B, and C-130J. In addition to this, the TUAf does not currently have a system to estimate these O&S costs. Under these circumstances, the objectives of this research are:

1. Determine the most suitable way to evaluate the O&S cost of the C-130E/B and J models.

2. Estimate the O&S cost of the 130E/B and J models by using that technique.
3. Perform sensitivity analysis to determine cost drivers and breakeven points.

Review of the Cost Accounting Methods

The first step in the research is to investigate and structure a suitable LCC model. The starting point of LCC Analysis was to follow the general guidelines presented in the AFIT Graduate Logistics Management class LOGM 614, Acquisition Logistics Overview Course. The handouts and the class project helped to clarify LCC Analysis, and the importance of LCC Management in decision-making. Additional sources that had to be applied were the library search engines, to include the Online Public Access Catalog, the CD-ROM based ProQuest, and Copernic.

This effort captured the principles contained in several theses, books, and DOD manuals. The DOD manuals, previous theses and the book written by Fabricky and Blanchard served as the sources that gave insight into LCC Analysis and provided a necessary framework and the techniques that had to be employed to implement the subsequent parts of the research.

Once the model and approach were determined, the second step was to perform the analysis of the C-130 E/B and J models' Operation & Support Systems.

Analysis of the C-130 Operation & Support Systems

In this step, the aim is to understand the cost elements related with the O&S systems of the C-130 models that will be compared. In the Literature Review part of this research, the Cost Breakdown Structure was presented, with the O&S cost elements. Data requirements for the analysis were identified.

The database format was prepared and sent to the Supply and Maintenance Squadrons, and Personnel and Comptroller Departments of the 12th Airlift Base. The confidential data such as the personnel number in the 12th Airlift Base and some confidential fiscal data will be notional. The data related to the C-130J was taken from C-130 System Program Office (SPO) located at Wright-Patterson Air Force Base; any vital data that could not be obtained from these sources was taken from secondary sources. Sensitivity analysis was performed on any questionable secondary data. Some secondary data, such as the acquisition cost of C-130J, can be rough estimates, but have a large affect on the O&S costs of the C-130 types. In this case sensitivity analysis was performed. The next step in the analysis was to perform the cost breakdown structure of the C-130 aircraft. There are several cost breakdown structures for different systems.

Cost Breakdown

In this step, the main task is to develop the Cost Break Down Structure for O&S costs of the C-130 aircraft. The main steps are presented in the “Operating and Support Cost Estimating Guide” issued by Office of the Secretary of Defense Cost Analysis Improvement Group (21:C-1). In this guide, the O&S cost breakdowns are provided for major systems such as aircraft, ships, missiles, combat vehicles, and electronic systems. In addition to this, this guide is parallel to the structure of the Cost Oriented Resource Estimation (CORE) model that was employed to execute the LCC Analysis (18). Cost personnel in Office of Secretary of Defense have currently used the CORE model, and the reasons for choosing this model are:

1. It can deal with the different cost estimating techniques.

2. It is oriented for aircraft-level estimates.
3. The spreadsheet can be easily used to implement this model.

The CORE model was used as the fundamental baseline for organizing the cost data for this research.

Estimation of Ownership Cost

The final step in this research was to estimate the total ownership costs of the C-130 types. After estimating the annual costs of each cost element in the O&S Cost Break down structure, they are summed to find the grand total for each type of aircraft to be compared. This is an accounting model, and the main step is determining the cost elements and their values. The values for each cost element are in a constant year dollars.

After estimating the grand total of the Ownership Cost of each type of C-130, a sensitivity analysis was performed over the costs that are subject to change. This reveals more credible estimates based on the vagueness of some values.

The last step is the break-even analysis. When comparing the alternatives over time, the break-even analysis may reveal that the alternative that seemed to be favorable can later become unfavorable. The selected alternative could change based on the corporate strategy of the organization. In this research the aircraft are in different stages of their life cycle. When we consider the life cycle of the aircraft to be 50 years, C-130E and B models are in the wear-out phase, and the J model can be either in the burn-in or useful period. Details about the model will be presented in Chapter IV.

Expected Results

The expected results of this research is a set of cost values for each different cost elements in the Cost Break Down structure of O&S related to C-130 aircraft over ten years. These sets of cost information show what cost elements are the cost drivers and have the most affect on the O&S cost of the C-130 aircraft model. This also may reveal the inefficient parts in the operation and maintenance of the C-130s, therefore, can show the quality improvement or efficiency improvement sides of the activities.

In addition to this, this research may provide a guide for performing LCC Analysis for the TUAF.

Scope and Limitations

The purpose of this research is to estimate the cost differences between Turkish C-130E, C-130B and USAF C-130J's O&S cost. It is not to establish as a model that can be used for other systems and products specifically. The general modeling approach could, however, be extended into analyzing other systems.

This research is not performed to find the absolute best alternative; but rather to reveal the O&S cost differences and analyze trade-offs. In the final analysis, the decisions on keeping and refurbishing the existed aircraft or buying the C-130J are up to the decision makers. The purpose of this effort is to provide an analysis of one key part of that decision the O&S costs.

US dollars will be used as a currency because of their stability. Almost all of the spare parts of the C-130s are provided from the USA, that is why it is suitable to use US

dollars in the analysis. The values were converted into “then-year dollars” (adjusted for inflation) using the year 2000 as a baseline.

In addition, this research has not been officially sponsored by the TUAF. That is why the data included and used here might not be supported by the TUAF and they may not match exactly with official values. It is also the same for the J model, which has been used in the United States Air Force (USAF).

Summary

The development of the cost breakdown structure for the C-130 aircraft, data collection, and application of the cost estimation techniques was used to estimate ownership costs for the C-130 E/B and J models. The data collected for each cost element in the O&S Cost Break Down Structure will be accompanied by the costs that are related with the operation and support activities. Then they will be summed and the grand total for the ownership cost of each type of aircraft will be found. Sensitivity and break-even analysis will be employed. Chapter IV will present the explanation and the rationale behind the allocation of each different cost element as well as the final results of this methodology.

IV. Data Description and Results

Chapter Overview

This chapter presents the analysis and the results of the O&S cost estimation methodology presented in Chapter III. This chapter includes the description of the cost elements of the C-130 and their cost allocation rationale. The chapter ends with a sensitivity analysis of the C-130 cost figures over the years according to the inflation rate.

Cost Breakdown Structure of C-130 Aircraft

The typical cost breakdown structure of the C-130 aircraft shown in Table IV.1 (21:C-1) is based on the CORE model.

Table IV.1. Cost Breakdown Structure

| | |
|---|-------------------------------------|
| 1.0 Mission personnel: | 4.0 Depot Maintenance: |
| 1.1 Operations: | 4.1 Overhaul: |
| 1.2 Maintenance: | 4.2 Other: |
| 1.3 12 th Airlift Base: | 5.0 Contractor Support: |
| 2.0 12 th Airlift Base Material Consumption: | 6.0 Sustaining Support: |
| 2.1 Fuel and Lubricants (POL), and Energy: | 6.1 Support Equipment Replacement: |
| 2.1.1 Fuel and Lubricants: | 6.2 Modification Kit: |
| 2.1.2 Electricity: | 6.3 Sustaining Engineering Support: |
| 2.2 Consumable Material: | 7.0 Indirect Support: |
| 2.2.1 Maintenance Material: | 7.1 Personnel Support: |
| 2.2.2 Mission Support Supplies: | 7.1.1 Specialty Training: |
| 2.3 Other Unit Level Consumption: | 7.1.2 Medical Support: |
| 3.0 Intermediate Maintenance: | 7.2 Installation Support: |

Table IV.2. Cost Allocation

| COST ELEMENTS | ALLOCATION REQUIRED? (Y/N) |
|---|---------------------------------------|
| 1.0 Mission personnel: | |
| 1.1 Operations: | Y |
| 1.2 Maintenance: | Y |
| 1.3 12 th Airlift Base: | |
| 2.0 12 th Airlift Base Material Consumption: | |
| 2.1 Fuel and Lubricants (POL), and Energy: | |
| 2.1.1 Fuel and Lubricants: | N |
| 2.1.2 Electricity: | Y |
| 2.2 Consumable Material: | |
| 2.2.1 Maintenance Material: | Y |
| 2.2.2 Mission Support Supplies: | Y |
| 2.3 Other Unit Level Consumption: | Y |
| 3.0 Intermediate Maintenance: | |
| 4.0 Depot Maintenance: | |
| 4.1 Overhaul: | N |
| 4.2 Other: | Y |
| 5.0 Contractor Support: | N/A |
| 6.0 Sustaining Support: | |
| 6.1 Support Equipment Replacement: | Y |
| 6.2 Modification Kit: | Y |
| 6.3 Sustaining Engineering Support: | N/A |
| 7.0 Indirect Support: | |
| 7.1 Personnel Support: | N/A |
| 7.1.1 Specialty Training: | N/A |
| 7.1.2 Medical Support: | Y |
| 7.2 Installation Support: | Y |

The Cost Breakdown Structure (CBS) includes all operations and support (O&S) resources consumed for C-130 missions. It includes all operation, direct, and indirect support personnel pay and allowances, all fuel, oil and repair part consumed as well as the cost of supporting activities of personnel.

After reviewing the typical cost breakdown structure of the C-130 aircraft, each of the costs should be handled individually in order to reach a better O&S cost estimate.

While analyzing each cost element, the raw cost data should be allocated if the cost information does not definitely belong to one type of the aircraft.

In this research, since most of the cost data was not precisely separated between the aircraft types, and (in some instances between C-130E and C-130B), those cost data were allocated between the flight squadrons and the C-130 aircraft type. Table IV.2 shows the cost elements and whether they required allocation.

The C-130E and C-130B data utilized in the analysis is taken from the 12th Airlift Base Supply Squadron, and is revealed in Appendix H, (English version in Appendix I), while the C-130J data is taken from the Air Logistics Center at Warner-Robbins AFB (WR-ALC) revealed in the Appendix J.

1.0 Mission personnel:

This is the cost element that refers to the pay and allowances of the 12th Airlift Base personnel that are directly or indirectly related to the operation and support of the C-130 aircraft. The mission personnel cost and its allocation are revealed in Appendix A.

1.1 Operations : This is the cost element that refers to the pay and allowances of the aircrew that are required to operate the C-130 aircraft. This cost element includes the pay and allowances of the pilots, navigators, flight engineers and the loadmasters. Since the personnel of the 222nd flight squadron do not fly for the other flight squadrons, cost will be obtained by multiplying their salaries by the number of crewmembers. Then, since both aircraft have the same number of aircrew, obtained cost for the C-130 aircraft is allocated between C-130E and C-130B. In this instance the allocation factor is the ratio of total number of C-130E to the total number of C-130s for C-130E allocation

factor, for the C-130B allocation factor, the ratio is the total number of C-130B over total C-130s.

While estimating the operating personnel cost of C-130J, it should not be forgotten that the superior navigation systems and trouble shooting systems of C-130J allows it to be operated without flight engineer and navigator.

1.2 Maintenance: This is the cost element that refers to the pay and allowances of the maintenance personnel including the officers, non-commissioned officers (NCO) and the civilian personnel in the 12th Airlift Base Maintenance Squadron. The base and the intermediate maintenance of the C-130 aircraft are performed by the maintenance squadron, since these resources are shared across aircraft types these costs must be allocated. The allocation factor for the Base and the Intermediate Maintenance will be the ratio of number of C-130 aircraft to the total number of aircraft in the 12th Airlift Base, since the man hours spent for the type of the aircraft are not kept in the database. The maintenance cost will be obtained by multiplying the number of the personnel by the corresponding annual salaries and the allocation factor. After getting the grand total cost of the maintenance personnel, it is allocated between the C-130 types using the allocation factor stated in the cost element 1.1. Since both C-130E and B are old aircraft, and have been serving more than 30 years, they are considered to be equally reliable and maintainable.

1.3 12th Airlift Base: This is the cost element that refers to the pay and allowances for the personnel that are not assigned to work in the flight squadrons and the maintenance squadrons. This cost element includes the cost of pay and allowances for the personnel working in the Civil Engineering, Supply, Communication, Administrative,

and the Security Squadrons. Since the personnel numbers of the squadrons are set by the regulations, and do not change according to the type of aircraft, and since all these services are being used by all flight squadrons, the cost of these services are allocated by using the ratio of total number of C-130s to the total number of aircraft (C-130s, C-160s, and CN-235s) in the 12th Airlift Base. All these aircraft types are cargo aircraft, and similar to each other.

In addition to this, every man in Turkey has to make 18 months obligatory commitment. Since all those soldiers work for security, communication, administrative, supply and civil engineering, their food and salary expenditures have to be accounted for by using the allocation factor stated above, then it is allocated between the C-130 types by using the allocation factor stated in the cost element 1.1.

2.0 12th Airlift Base Material Consumption:

This is the cost of the all material consumed directly or indirectly on the operation and support of the C-130 aircraft. The optimistic, average and pessimistic allocations of this cost element revealed in Appendix B.

2.1 Fuel and Lubricants (POL), and Energy: This is the cost element that refers to the cost of fuel, oil and the energy required to operate the C-130 aircraft. The allocation factor and the rationale for finding the cost of that consumption will be addressed in the following subsections.

2.1.1 Fuel and Lubricants: This is the cost element that refers to the cost of the fuel and oil required for the unit flying operations. The unit level cost of fuel and the oil is found by multiplying the consumption of fuel and the oil per hour by the annual average flight hours and the cost of fuel and the oil prices per liter in Turkey. Since these

substances are managed centrally by the Logistic Command the prices of these substances are the same all over Turkey. In the analysis, the flight hour is taken as a representative data, and sensitivity analysis is applied. The fuel consumption of the Turkish C-130s (4500 lb. per hour, or 692.5 gallons per hour) is similar to the US C-130E fuel consumption of 715 gallons per hour. The Turkish data was utilized across the analysis.

2.1.2 Electricity: The annual base electricity consumption for the year 2000 has been received. These costs are allocated among the supported aircraft in the flight squadron. The allocation factor for the cost of electricity for the C-130 aircraft is as stated in the cost element 1.3. After getting the share of the C-130, it is allocated between C-130E and B by using the allocation factor stated in cost element 1.1.

2.2 Consumable Material: This is the cost element that refers to the cost of consumable materials in the operation and support of the C-130 aircraft.

2.2.1 Maintenance Material: This is the cost element that refers to the cost of repair and consumable materials expended during maintenance. This includes the capacitors, transistors, fuses and other bit-and-piece material. The data for consumable materials for each type of aircraft and their usage is kept by the AGSO (Aircraft and Ground Systems Office). Based on that information, every quarter the new consumable material list is prepared. The cost of consumable material for the C-130s will be taken directly from AGSO, which are revealed in Appendix C. On the other hand, the reparable material expenditure is not kept, therefore the representative data from the supply squadron is used for the reparable material consumption and sensitivity analysis is applied.

2.2.2 Mission Support Supplies: This is the cost element that refers to the cost of material to support the mission personnel. This includes the cost of material such as cleaning and office supplies, charts, and computer consumables. The supply squadron centrally manages these materials and their records are kept for each of the squadrons. The value for this cost element was obtained from the Supply Squadron for the 222nd flight squadron was allocated between the C-130 types by using the allocation factor stated in the cost element 1.1.

2.3 Other Unit Level Consumption: This is the cost element that refers to unit level consumption costs that are not included in previous items. This includes the cost of water, telephone, and sewage. Since there is no specific allocation for these costs, the allocation factor will be the ratio of 222nd flight squadron personnel to the total number of personnel in the 12th Airlift Base. Thus, the cost of unit level consumption of these will be the multiplication of the grand total cost of these services by that allocation factor. After finding the total cost of the consumption, the cost allocation stated in the cost element 1.1 is used to find the share of each type of C-130 aircraft.

3.0 Intermediate Maintenance (External to Unit):

12th Airlift Base performs both unit and intermediate level maintenance of the C-130 aircraft, therefore, intermediate level maintenance cost has already been included. Therefore these costs are set at “0” across all alternatives.

4.0 Depot Maintenance:

This is the cost element that refers to the cost of material, personnel and the overhead incurred in performing the depot-level maintenance of the C-130 aircraft, their components, and the ground support equipments. The optimistic, average and pessimistic

allocations of this cost element are revealed in Appendix D.

4.1 Overhaul: This is the cost element that refers to the cost of material and the labor costs for overhaul or rework of aircraft returned to a centralized depot facility. Since this cost is not specified for each type of the aircraft, the representative data for C-130E and B from supply squadron is used. The C-130J is the newest aircraft. According to the bathtub curve, the reliability of an aircraft drops as the age of the aircraft increases. Since the overhaul cost of the C-130J aircraft could not be specifically found, it is anticipated to fall between \$250,000 and \$750,000. Sensitivity analysis is applied for each type of the aircraft to assess impacts of the differences on the results.

4.2 Other: This is the cost element that refers to any significant cost of material and labor that is not included in the previous item. This may include the cost of activities such as supply, administrative services, maintenance and transportation. In this cost element there are two factors (direct and indirect) for the personnel salaries. The allocation factor for the direct personnel is just for the allocation between C-130E and B types as stated in the cost element 1.1. On the other hand, while allocating the indirect personnel support in depot maintenance, we have to consider the other types of aircraft. In this case, the first allocation factor is the C-130E/B quantities divided by the total number of aircraft stationed in the 12th Airlift Base as stated in the cost element 1.3. It is allocated between the C-130E and B by using the allocation factor stated in the cost element 1.1.

5.0 Contractor Support:

This is the cost element that refers to the cost of material, and the labor provided by a contractor to support the logistics required by the C-130 aircraft system. Since, the military personnel in the 12th Airlift Base service all the logistics supports, this cost is set at “0” across all alternatives.

6.0 Sustaining Support:

This is the cost element that refers to the cost of material, and the personnel costs incurred in providing operational reliability, overcoming mission deficiencies, and ensuring system conformance with the specifications and the standards. The optimistic, average and pessimistic allocations of this cost element are revealed in Appendix E.

6.1 Support Equipment Replacement: This is the cost element that refers to the cost of support equipment material required for the operation and the support of C-130 aircraft, aircraft subsystems, training systems, and other associated support equipment, the total cost of this cost element is kept in the BEMO in the supply squadron. All that equipment is also being used by the other types of aircraft. The total cost of that equipment is allocated between the aircraft types by using the allocation factor stated in the cost element 1.3. After obtaining the share for the C-130 aircraft, it is allocated between C-130E and B by using the allocation factor stated in the cost element 1.1.

6.2 Modification Kit: This is the cost element that refers to the cost of procuring and installing modification kits and modification kit initial spares required for the aircraft, and associated support and training equipment. This data is kept by the maintenance operation office, but not specified across the aircraft types, that is why the

representative data is utilized and sensitivity analysis is applied. The allocation factor between the C-130 types is as stated in the cost element 1.1.

6.3 Sustaining Engineering Support: This is the cost element that refers to the cost of material, and the personnel incurred in providing continued system engineering and program management oversight to determine the integrity of a system to provide the operational reliability, and to ensure system conformance with the specifications and the standards. This service is provided by the personnel of the 12th Airlift Base, so it is already included.

7.0 Indirect Support:

This is the cost element that refers to the cost of material, and the personnel that are not assigned directly to the operation and the support of the C-130 aircraft, but indirectly required activities for the operation and the support activities of C-130s. The allocations of this cost element are revealed in Appendix F.

7.1 Personnel Support: This is the cost element that refers to the cost of system specific and specialty training of the military personnel. Most of this cost element has already been accounted for in the cost element 1.3 (Appendix A).

7.1.1 Specialty Training: This is the cost element that refers to the cost of material, and the personnel for system specific training and specialty training. There is no specialty training. Pilots receive their training while performing the missions, while the other officers and NCOs are being trained while performing their daily tasks.

7.1.2 Medical Support: This is the cost element that refers to the cost of material, and the personnel needed to support the 222nd flight squadron. The pay and allowances of the medical personnel times the number of medical people will result in the

personnel cost. This cost has already been accounted for in the cost element 1.3. In addition, the medical supply unit keeps the medicines cost. The base is operating three types of flight squadrons, and the number of the people in the flight squadrons are the same by regulations, and the rest of the personnel are assigned there to support those three types of aircraft. The allocation factor is therefore as stated in the cost element 1.3 for the medical expenses that belong to the operation and the support of C-130 aircraft. Medical expenditures have to be allocated between the C-130 types by using the allocation factor stated in the cost element 1.1. While estimating the share for the C-130J, the numbers of the operating personnel will have to be considered, since there are no flight engineers and navigators on the C-130J.

7.2 Installation Support: This is the cost element that refers to the cost of material and the personnel assigned to the construction, maintenance, and engineering support of the real properties related to the 222nd flight squadron and the 222 flight line. The data related to these activities are kept by the Civil Engineering Squadron, and then they are refunded by the Supply Squadron. Since this cost element is not specified for each squadron, it is allocated between the flight squadrons considering their aircraft numbers, so the allocation factor is as stated in the cost element 1.3. After obtaining the share of C-130 squadron, it is allocated between the C-130 types by using the allocation factor stated in the cost element 1.1. After performing the analysis, the cost summary and the percentage of each cost element to the total O&S became as it is seen in the Table IV.3.

Table IV.3. Summary of Costs per Aircraft (Average)

| | C-130E | C-130B | C-130J | C-130E | C-130B | C-130J |
|--|-----------------------|-----------------------|-----------------------|----------|----------|----------|
| 1.0 Mission personnel: | | | | | | |
| 1.1 Operations: | \$137,333,33 | \$137,333,33 | \$64,053,00 | 3,97% | 3,97% | 2,89% |
| 1.2 Maintenance: | \$43,336,94 | \$43,336,94 | \$43,336,94 | 1,25% | 1,25% | 1,95% |
| 1.3 12 th Airlift Base: | \$67,686,49 | \$67,686,49 | \$67,686,49 | 1,96% | 1,96% | 3,05% |
| 2.0 12th Airlift Base Material Consumption: | | | | | | |
| 2.1 Fuel Oil and Lubricants (POL), and Energy: | | | | | | |
| 2.1.1 Fuel and Oil: | \$1,350,135,00 | \$1,350,135,00 | \$1,003,680,00 | 39,06% | 39,02% | 45,21% |
| 2.1.2 Electricity: | \$6,682,59 | \$6,682,59 | \$6,682,59 | 0,19% | 0,19% | 0,30% |
| 2.2 Maintenance Material: | | | | | | |
| 2.2.1 Consumable Material: | \$6,710,10 | \$9,914,58 | \$3,250,32 | 0,19% | 0,29% | 0,15% |
| 2.2.2 Repairable Material: | \$852,428,57 | \$852,428,57 | \$310,173,32 | 24,66% | 24,64% | 13,97% |
| 2.2.2 Mission Sup. Supplies: | \$2,564,10 | \$2,564,10 | \$2,564,10 | 0,07% | 0,07% | 0,12% |
| 2.3 Other Unit Level Consumption: | \$4,955,99 | \$4,955,99 | \$4,955,99 | 0,14% | 0,14% | 0,22% |
| 3.0 Intermediate Maintenance | | | | | | |
| 4.0 Depot Maintenance: | | | | | | |
| 4.1 Overhaul: | \$750,000,00 | \$750,000,00 | \$500,000,00 | 21,70% | 21,68% | 22,52% |
| 4.2 Other: | \$54,570,62 | \$54,570,62 | \$54,570,62 | 1,58% | 1,58% | 2,46% |
| 5.0 Contractor Support: | | | | | | |
| 6.0 Sustaining Support: | | | | | | |
| 6.1 Support Equipment Replacement: | \$122,801,82 | \$122,801,82 | \$122,801,82 | 3,55% | 3,55% | 5,53% |
| 6.2 Modification Kit: | \$35,000,00 | \$35,000,00 | \$15,000,00 | 1,01% | 1,01% | 0,68% |
| 7.0 Indirect Support: | | | | | | |
| 7.1 Personnel Support: | | | | | | |
| 7.1.1 Specialty Training: | | | | | | |
| 7.1.2 Medical Support: | \$3,045,02 | \$3,045,02 | \$1,827,01 | 0,09% | 0,09% | 0,08% |
| 7.2 Installation Support: | \$19,594,59 | \$19,594,59 | \$19,594,59 | 0,57% | 0,57% | 0,88% |
| TOTAL | \$3,456,845,16 | \$3,460,049,65 | \$2,220,176,79 | 1 | 1 | 1 |

As seen from Table IV.3 the major cost elements are repairable material, overhaul and fuel cost. The C-130J has the lowest O&S cost. Since it is the newest aircraft it has the lowest maintenance cost, as it was discussed by referring the bathtub curve before. In addition, due to its improved propulsion system, it uses 15% less fuel than the other types of C-130 aircraft, so its fuel cost is the lowest.

Sensitivity Analysis

Sensitivity analysis is required when some of the data are representative in order to reach a better assessment about the alternatives. In this case, overhaul costs, repairable material costs, flying hours, and modification kit costs for each type of the aircraft and C-

130J procurement cost are representative. Sensitivity analysis is applied to those costs, as well as the inflation rate of the USA, so the O&S cost of each type of aircraft take their shape according to optimistic, average, and pessimistic approaches. Some data are gotten as an interval. The lower bound of the interval was called “optimistic”, while the upper bound of the interval “pessimistic”, the average of the upper and the lower bounds of the interval was called “average” data. The sensitivity analysis for C-130J procurement cost, and inflation are applied in the breakeven analysis. The “optimistic” approach results are given in the Table IV.4 below.

Table IV.4. Summary of Costs per Aircraft (Optimistic)

| | C-130E | C-130B | C-130J | C-130E | C-130B | C-130J |
|--|-----------------------|-----------------------|-----------------------|----------|----------|----------|
| 1.0 Mission personnel: | | | | | | |
| 1.1 Operations: | \$137.333,33 | \$137.333,33 | \$64.053,00 | 5,12% | 5,11% | 3,93% |
| 1.2 Maintenance: | \$43.336,94 | \$43.336,94 | \$43.336,94 | 1,62% | 1,61% | 2,66% |
| 1.3 12 th Airlift Base: | \$67.686,49 | \$67.686,49 | \$67.686,49 | 2,52% | 2,52% | 4,15% |
| 2.0 12th Airlift Base Material Consumption: | | | | | | |
| 2.1 Fuel Oil and Lubricants (POL), and Energy: | | | | | | |
| 2.1.1 Fuel and Oil: | \$900.090,00 | \$900.090,00 | \$669.180,00 | 33,54% | 33,46% | 41,04% |
| 2.1.2 Electricity: | \$6.682,59 | \$6.682,59 | \$6.682,59 | 0,25% | 0,25% | 0,41% |
| 2.2 Maintenance Material: | | | | | | |
| 2.2.1 Consumable Material: | \$6.710,10 | \$9.914,58 | \$3.250,32 | 0,25% | 0,37% | 0,20% |
| 2.2.2 Repairable Material: | \$783.924,39 | \$787.128,58 | \$310.173,32 | 29,21% | 29,26% | 19,02% |
| 2.2.2 Mission Sup. Supplies: | \$2.564,10 | \$2.564,10 | \$2.564,10 | 0,10% | 0,10% | 0,16% |
| 2.3 Other Unit Level Consumption: | \$4.955,99 | \$4.955,99 | \$4.955,99 | 0,18% | 0,18% | 0,30% |
| 3.0 Intermediate Maintenance | | | | | | |
| 4.0 Depot Maintenance: | | | | | | |
| 4.1 Overhaul: | \$500.000,00 | \$500.000,00 | \$250.000,00 | 18,63% | 18,59% | 15,33% |
| 4.2 Other: | \$54.570,62 | \$54.570,62 | \$54.570,62 | 2,03% | 2,03% | 3,35% |
| 5.0 Contractor Support: | | | | | | |
| 6.0 Sustaining Support: | | | | | | |
| 6.1 Support Equipment Replacement: | \$122.801,82 | \$122.801,82 | \$122.801,82 | 4,58% | 4,57% | 7,53% |
| 6.2 Modification Kit: | \$30.000,00 | \$30.000,00 | \$10.000,00 | 1,12% | 1,12% | 0,61% |
| 7.0 Indirect Support: | | | | | | |
| 7.1 Personnel Support: | | | | | | |
| 7.1.1 Specialty Training: | | | | | | |
| 7.1.2 Medical Support: | \$3.045,02 | \$3.045,02 | \$1.827,01 | 0,11% | 0,11% | 0,11% |
| 7.2 Installation Support: | \$19.594,59 | \$19.594,59 | \$19.594,59 | 0,73% | 0,73% | 1,20% |
| TOTAL | \$2.683.295,98 | \$2.689.704,66 | \$1.630.676,79 | 1 | 1 | 1 |

In this case, C-130J has still the lowest O&S cost, the overhaul cost, reparable material and the fuel cost are the major cost drivers. The optimistic, average and pessimistic data were utilized in order to see the cost change in terms of “optimistic” (the lower bound of the interval), and “pessimistic” (the upper bound of the interval), also, the average cost data were utilized to reach an accurate O&S cost figures. The results of applying the pessimistic approach are shown in the Table IV.5:

Table IV.5. Summary of Costs per Aircraft (Pessimistic)

| | C-130E | C-130B | C-130J | C-130E | C-130B | C-130J |
|--|-----------------------|-----------------------|-----------------------|----------|----------|----------|
| 1.0 Mission personnel: | | | | | | |
| 1.1 Operations: | \$137.333,33 | \$137.333,33 | \$64.053,00 | 3,24% | 3,24% | 2,28% |
| 1.2 Maintenance: | \$43.336,94 | \$43.336,94 | \$43.336,94 | 1,02% | 1,02% | 1,54% |
| 1.3 12 th Airlift Base: | \$67.686,49 | \$67.686,49 | \$67.686,49 | 1,60% | 1,60% | 2,41% |
| 2.0 12th Airlift Base Material Consumption: | | | | | | |
| 2.1 Fuel Oil and Lubricants (POL), and Energy: | | | | | | |
| 2.1.1 Fuel and Oil: | \$1.800.180,00 | \$1.800.180,00 | \$1.338.180,00 | 42,49% | 42,45% | 47,68% |
| 2.1.2 Electricity: | \$6.682,59 | \$6.682,59 | \$6.682,59 | 0,16% | 0,16% | 0,24% |
| 2.2 Maintenance Material: | | | | | | |
| 2.2.1 Consumable Material: | \$6.710,10 | \$9.914,58 | \$3.250,32 | 0,16% | 0,23% | 0,12% |
| 2.2.2 Reparable Material: | \$927.642,86 | \$927.642,86 | \$306.923,00 | 21,89% | 21,88% | 10,94% |
| 2.2.2 Mission Sup. Supplies: | \$2.564,10 | \$2.564,10 | \$2.564,10 | 0,06% | 0,06% | 0,09% |
| 2.3 Other Unit Level Consumption: | \$4.955,99 | \$4.955,99 | \$4.955,99 | 0,12% | 0,12% | 0,18% |
| 3.0 Intermediate Maintenance | | | | | | |
| 4.0 Depot Maintenance: | | | | | | |
| 4.1 Overhaul: | \$1.000.000,00 | \$1.000.000,00 | \$750.000,00 | 23,60% | 23,58% | 26,72% |
| 4.2 Other: | \$54.570,62 | \$54.570,62 | \$54.570,62 | 1,29% | 1,29% | 1,94% |
| 5.0 Contractor Support: | | | | | | |
| 6.0 Sustaining Support: | | | | | | |
| 6.1 Support Equipment Replacement: | \$122.801,82 | \$122.801,82 | \$122.801,82 | 2,90% | 2,90% | 4,38% |
| 6.2 Modification Kit: | \$40.000,00 | \$40.000,00 | \$20.000,00 | 0,94% | 0,94% | 0,71% |
| 7.0 Indirect Support: | | | | | | |
| 7.1 Personnel Support: | | | | | | |
| 7.1.1 Specialty Training: | | | | | | |
| 7.1.2 Medical Support: | \$3.045,02 | \$3.045,02 | \$1.827,01 | 0,07% | 0,07% | 0,07% |
| 7.2 Installation Support: | \$19.594,59 | \$19.594,59 | \$19.594,59 | 0,46% | 0,46% | 0,70% |
| TOTAL | \$4.237.104,45 | \$4.240.308,93 | \$2.806.426,47 | 1 | 1 | 1 |

Sensitivity Analysis was applied to the major cost elements of overhaul cost, reparable material cost, flying hours, and modification kit cost. When the sensitivity analysis was applied, it was seen that in both instances, C-130J has the lowest O&S cost.

Breakeven Analysis

Breakeven Analysis is important for keep-or-buy decisions. In this research, the operation and support costs of C-130E, C-130B and C-130J models were investigated. According to the analysis, C-130J has the lowest O&S cost in each case (optimistic-pessimistic), when the inflation rate of the USA is held constant at 2.3% over 40 years. (as can be seen from the Figure IV.1). The TUAf already has the other types of aircraft, and in this case the decision makers would want to know how long would it take to reach a break-even if C-130J is procured. The breakeven analysis covered the next 40 years (from year 2000) in the sensitivity analysis for inflation rate.

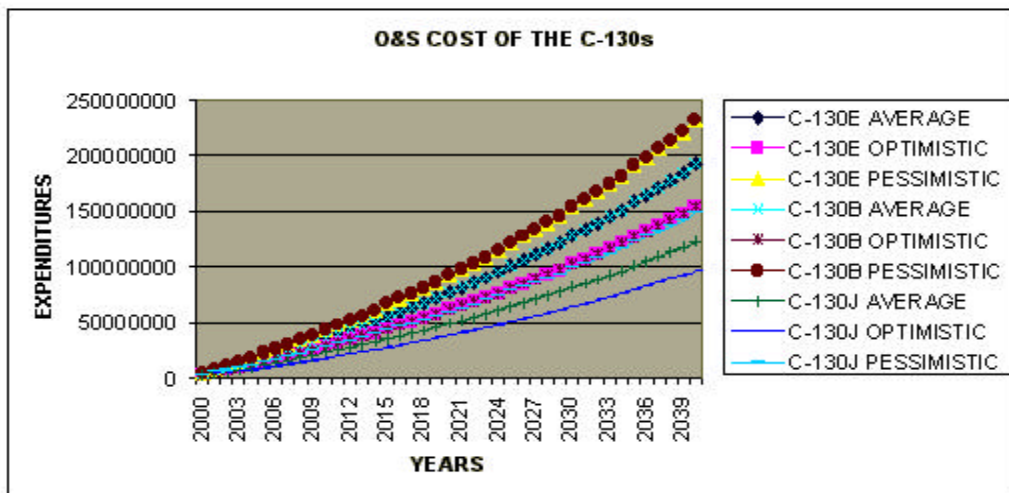


Figure IV.1. O&S Costs of Each Type of Aircraft over 40 Years with 2.3% Inflation Rate

Sensitivity Analysis for Inflation Rate

While performing breakeven analysis, the other variable that has to be considered is the inflation rate. While performing the analysis, the 2001 inflation rate of USA was determined to be 2.3%. By taking this inflation rate as a stand point, future inflation rates

can be estimated. In this research the lowest inflation rate for USA for next 39 years was assumed as 1.8% for optimistic approach, 2.3% for average, 3.3%, and 5% for pessimistic. The computation of the constant rates of the inflation for the next 39 years for optimistic, constant and pessimistic approaches is revealed in Appendix G.

When the sensitivity analysis is applied to the inflation rate, while holding the other representative data average across 40 years, the breakeven point changes according to the inflation rate. Figure IV.2 shows the breakeven point when the inflation rate is 1.8% from the year 2002 through 2040.

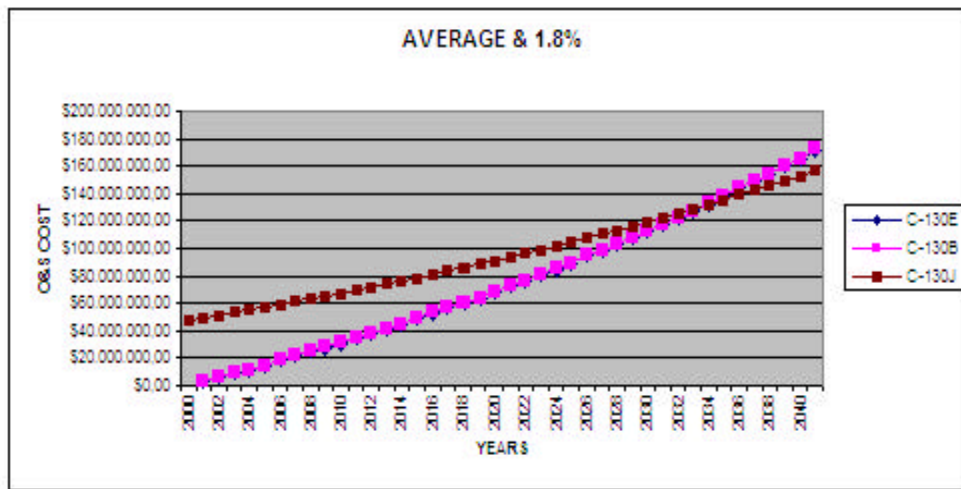


Figure IV.2. Sensitivity Analysis to the Average Data with 1.8% Inflation Rate

As it is shown in Figure IV.2, when the representative data and the procurement cost of the C-130J is taken average, while the inflation rate 1.8% from the year 2002 to 2040, then the breakeven point would be somewhere between the years 2032 and 2033.

The sensitivity analysis is applied to the inflation rate while the cost data is held at average to see the inflation affect on the breakeven point, it would be useful to look at additional inflation figures effects.

If the inflation rate of the USA is assumed to stay 2.3% over 40 years, then the breakeven point would be as seen from Figure IV.3. The breakeven point would be somewhere between the years 2030 and 2031.

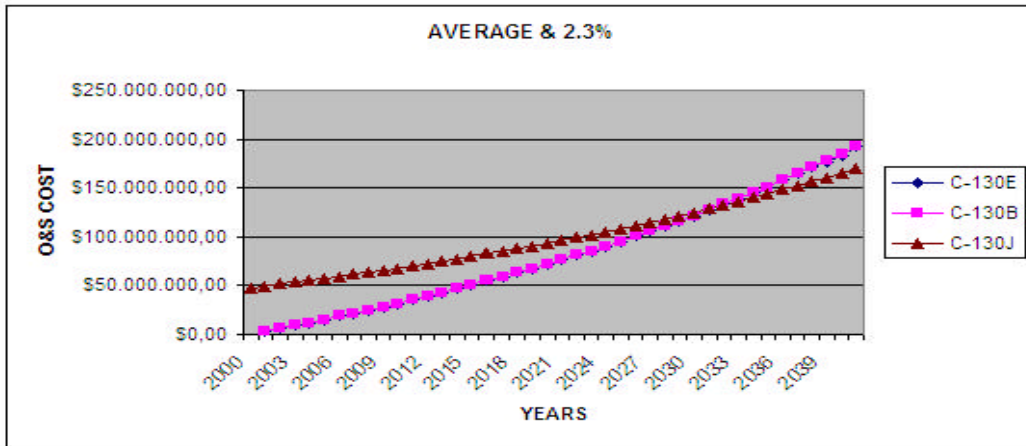


Figure IV.3. Sensitivity Analysis to Average Data with 2.3% Inflation Rate

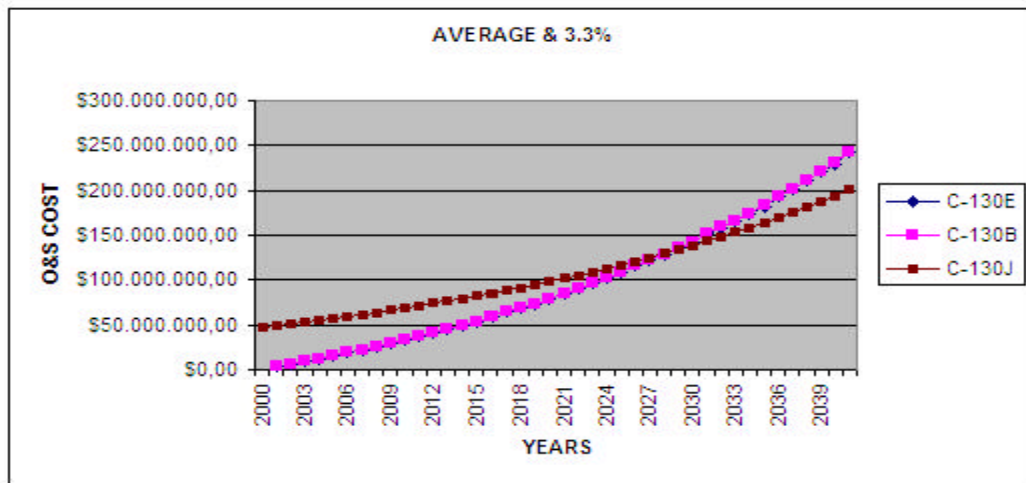


Figure IV.4. Sensitivity Analysis to Average Data with 3.3% Inflation Rate

When the representative data and the procurement cost of C-130J are held constant, and the inflation rate of the USA is 3.3%, then the breakeven point would be some where between the years 2027 and 2028.

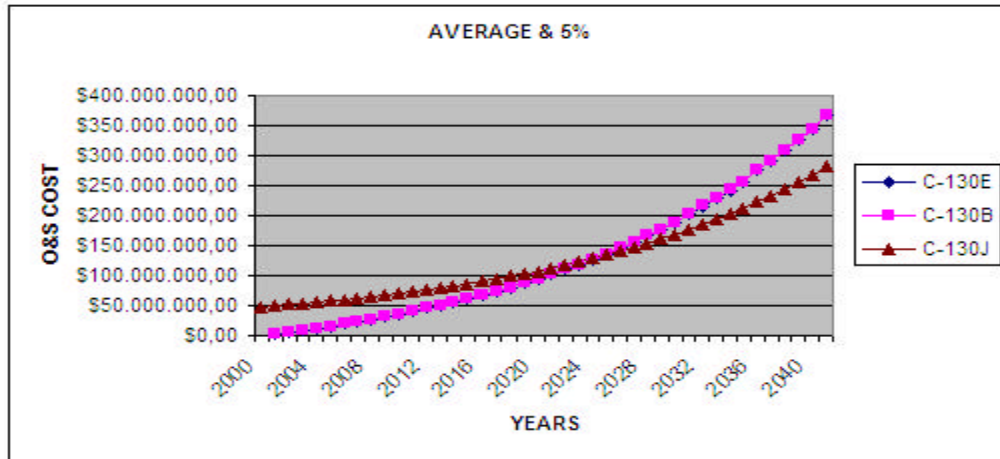


Figure IV.5. Sensitivity Analysis to Average Data with 5% Inflation Rate

As it can be seen from Figure IV.5 the breakeven point would be somewhere between the years 2023 and 2024, when the inflation rate is held at 5%.

As the analysis showed, when the procurement cost of C-130J is taken at the average estimate (\$47,500,000), and the representative O&S cost data averages are used, it reaches breakeven point somewhere between years 2023 and 2033. The actual procurement cost of C-130J in the year 2000 was \$55,000,000. However, if TUAF decides to buy the C-130J, it is quite likely that some other air forces will want to buy. In this case, the price could drop. The representative data are also subject to change. Sensitivity analysis, has to be applied in order to reach a better assessment. The procurement cost of C-130J was taken as \$40,000,000 optimistically in the analysis.

The effect of the inflation should also be investigated on the optimistic data for thorough analysis. The section below shows the effect of the inflation figure on the breakeven point with the optimistic data. Figure IV.6 shows the breakeven point with the optimistic data and 1.8% inflation rate.

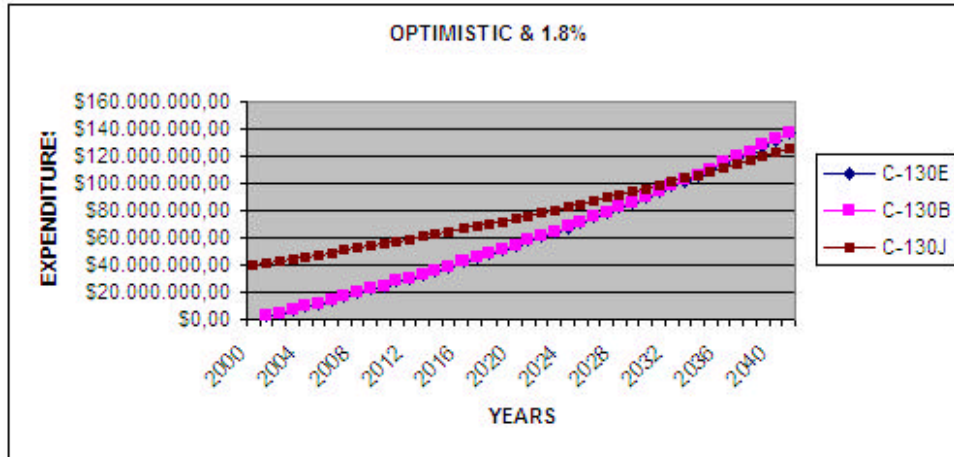


Figure IV.6. Sensitivity Analysis to Optimistic Data with 1.8% Inflation Rate

When the representative data and the procurement cost of C-130J is taken optimistically with 1.8% inflation rate, then the breakeven point would be somewhere between the years 2033 and 2034.

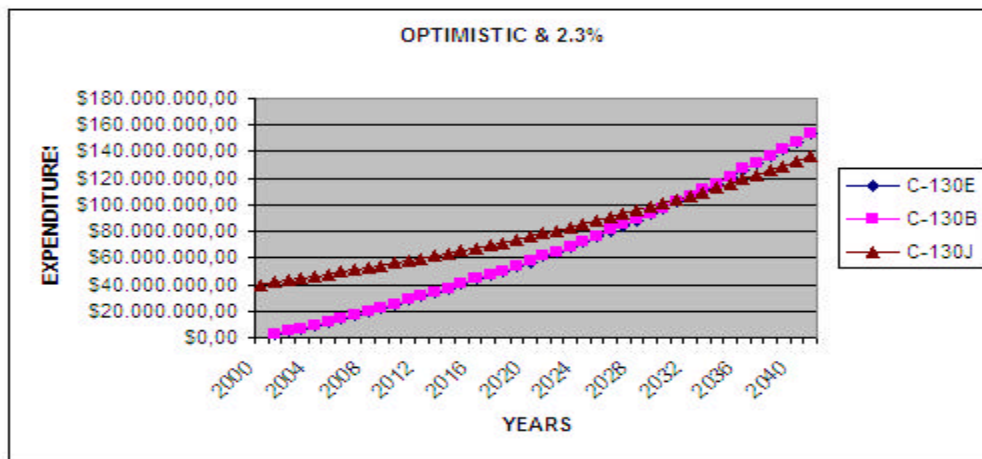


Figure IV.7. Sensitivity Analysis to Optimistic Data with 2.3% Inflation Rate

When the representative data and the procurement cost of C-130J are taken optimistically with the 2.3% inflation rate, then the breakeven point would be somewhere between the years 2031 and 2032.

When the representative data and the procurement cost of C-130J are taken optimistically with the 3.3% inflation rate, then the breakeven point would be somewhere between the years 2027 and 2028.

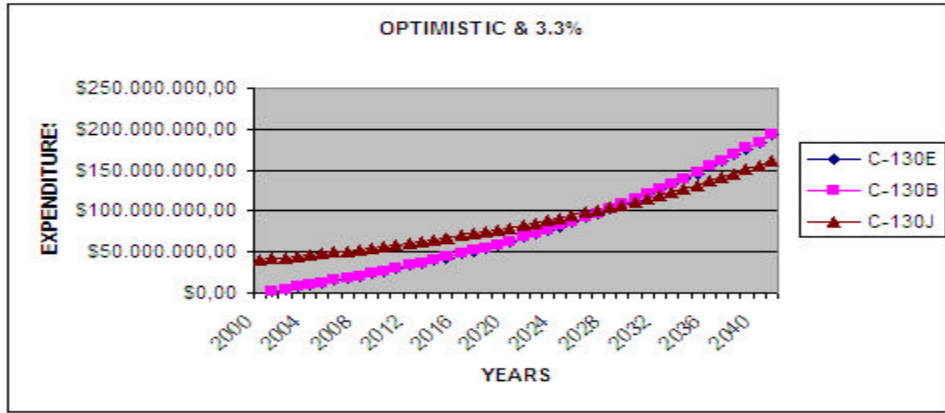


Figure IV.8. Sensitivity Analysis to Optimistic Data with 3.3% Inflation Rate

When the representative data and the procurement cost of C-130J are taken optimistically with the 5% inflation rate, then the breakeven point would be somewhere between the years 2023 and 2024 as it is seen in the Figure IV.9.

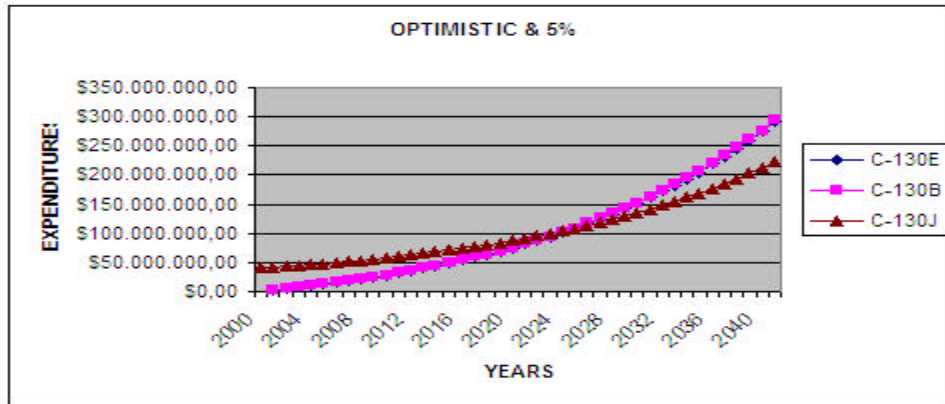


Figure IV.9. Sensitivity Analysis to Optimistic Data with 5% Inflation Rate

In this step, the effect of the inflation on the pessimistic data was investigated. The procurement cost of C-130J is taken as \$55,000,000 based on the year 2000 values.

When the representative data and the procurement cost of C-130J are taken pessimistically with the 1.8% inflation rate, then the breakeven point would be somewhere between the years 2032 and 2033 as it is seen in the Figure IV.10.

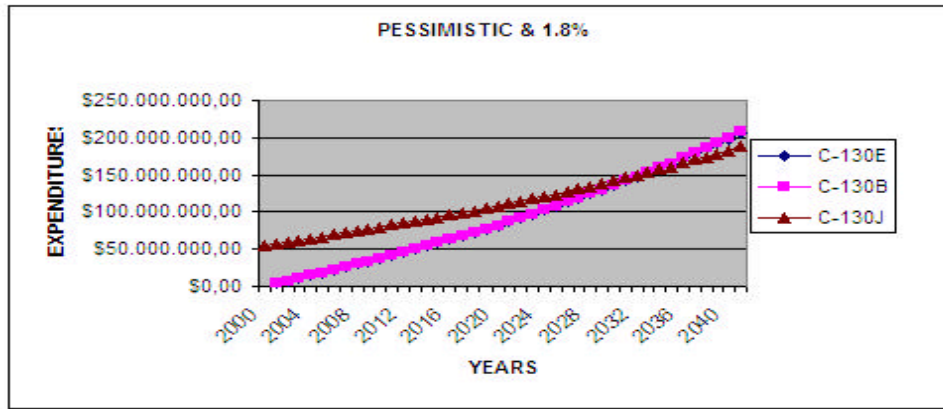


Figure IV.10. Sensitivity Analysis to Pessimistic Data with 1.8% Inflation Rate

When the representative data, and the procurement cost of the C-130J are taken pessimistically, while the inflation rate 2.3%, then the breakeven point would be somewhere between the years 2029 and 2030, as it seen from the Figure IV.11.

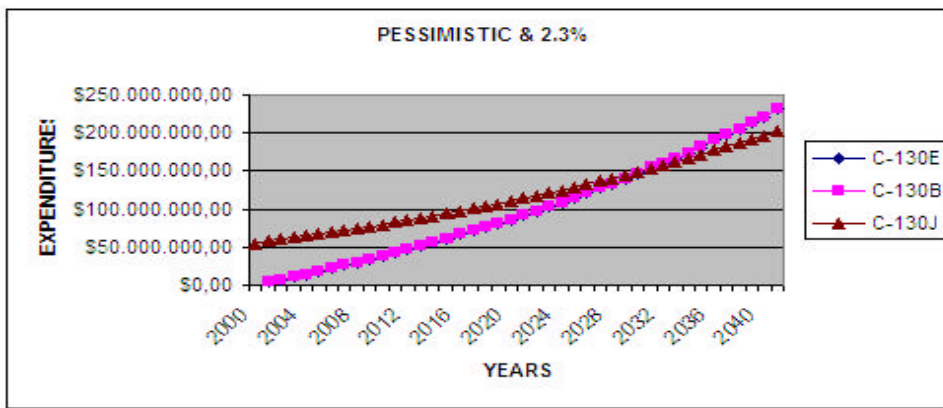


Figure IV.11. Sensitivity Analysis to the Pessimistic Data with 2.3% Inflation Rate

When the representative data, and the procurement cost of the C-130J are taken pessimistically, while the inflation rate 3.3%, then the breakeven point would be somewhere between the years 2026 and 2027, as it seen in Figure IV.12.

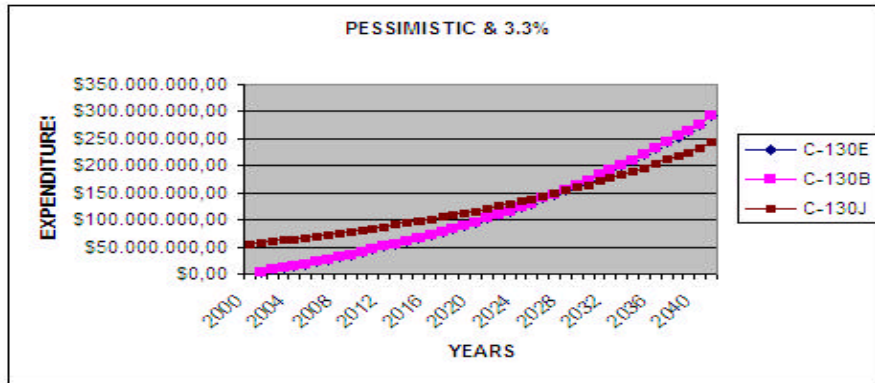


Figure IV.12. Sensitivity Analysis to the Pessimistic Data with 3.3% Inflation Rate

When the representative data and the procurement cost of the C-130J are taken pessimistically, while the inflation rate 5%, then the breakeven point would be somewhere between the years 2023 and 2024, as it seen from the Figure IV.13.

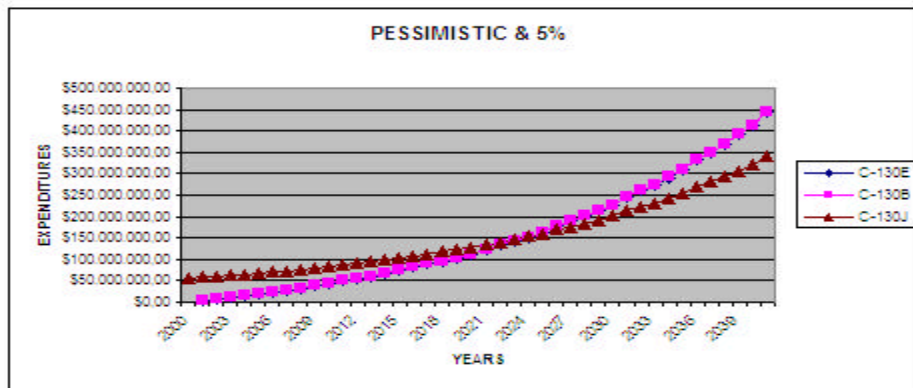


Figure IV.13. Sensitivity Analysis to the Pessimistic data with 5% Inflation Rate

In the last step, the reverse possibilities have to be considered, in this research, C-130E and C-130B were considered to have similar reliabilities, while the C-130J was

considered more reliable because of its age and technology. The optimistic and pessimistic values of the aircraft might not be faced at the same time. In this step the reverse situations of C-130E/B and J models were analyzed.

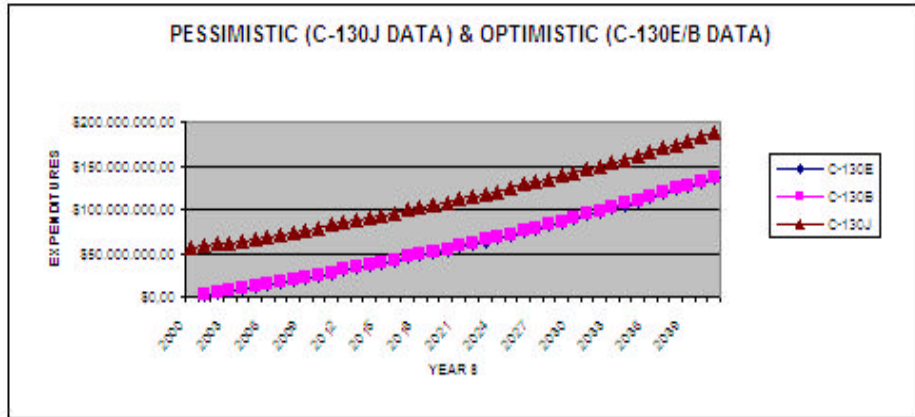


Figure IV.14. Sensitivity Analysis to the Pessimistic C-130J and Optimistic C-130E/B Data with 1.8% Inflation Rate

When the C-130E/B values are taken optimistically, while C-130J data pessimistically with 1.8% inflation rate, the breakeven point would be beyond next 40 years.

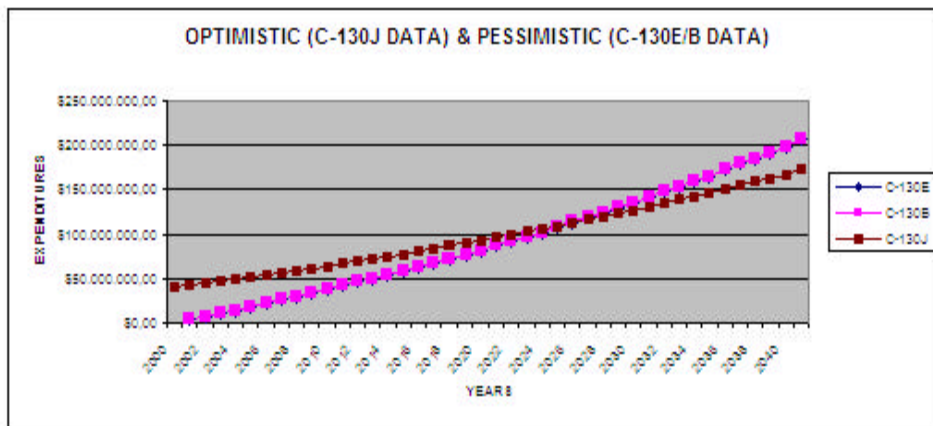


Figure IV.15. Sensitivity Analysis to the Optimistic C-130J and Pessimistic C-130E/B Data with 1.8% Inflation Rate

When the C-130E/B values are taken pessimistically, while C-130J data optimistically with 1.8% inflation rate, the breakeven point would be somewhere between the years 2024 and 2025 as it seen in the Figure IV.15.

When the C-130E/B values are taken optimistically, while C-130J data pessimistically with 2.3% inflation rate, the breakeven point would be beyond next 40 years.

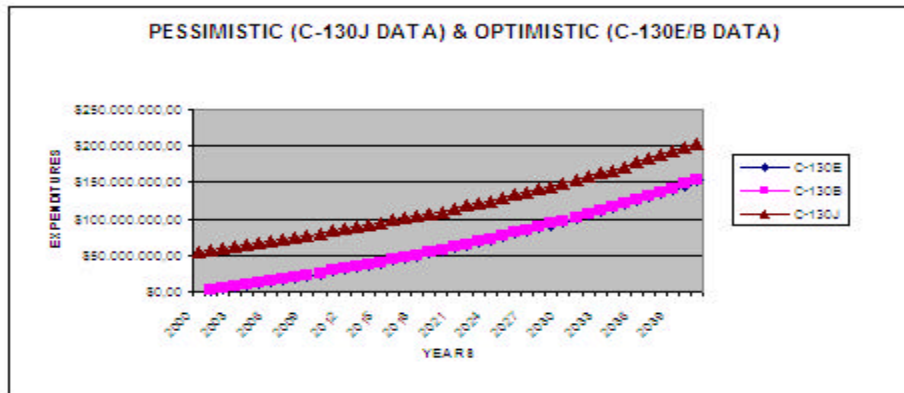


Figure IV.16. Sensitivity Analysis to the Pessimistic C-130J and Optimistic C-130E/B Data with 2.3% Inflation Rate

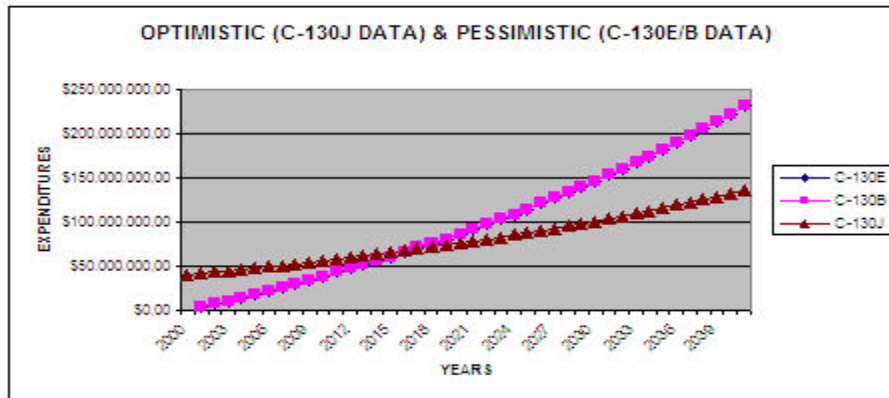


Figure IV.17. Sensitivity Analysis to the Optimistic C-130J and Pessimistic C-130E/B Data with 2.3% Inflation Rate

When the C-130E/B values are taken pessimistically, while C-130J data optimistically with 2.3% inflation rate, the breakeven point would be somewhere between the years 2015 and 2016 as it seen in the Figure IV.17.

When the C-130E/B values are taken optimistically, while C-130J data pessimistically with 3.3% inflation rate, the breakeven point would be beyond next 40 years.

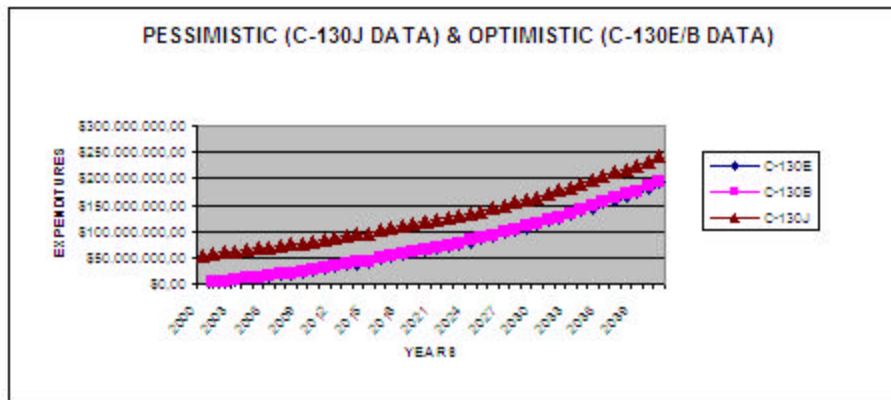


Figure IV.18. Sensitivity Analysis to the Pessimistic C-130J and Optimistic C-130E/B Data with 3.3% Inflation Rate

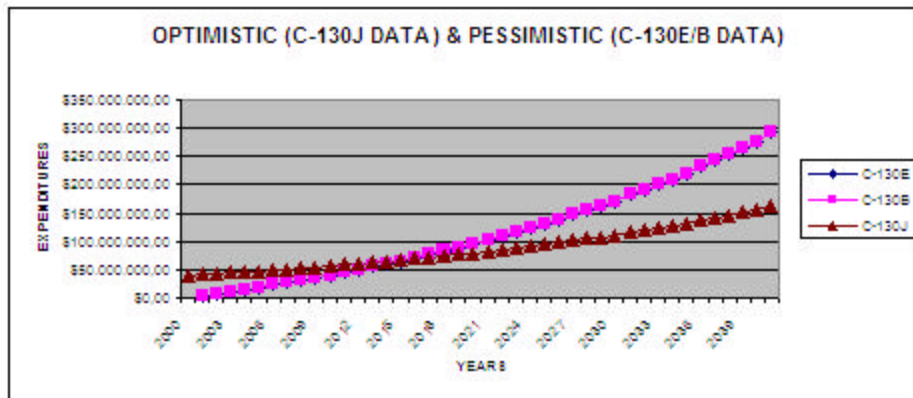


Figure IV.19. Sensitivity Analysis to the Optimistic C-130J and Pessimistic C-130E/B Data with 3.3% Inflation Rate

When the C-130E/B values are taken pessimistically, while C-130J data optimistically with 3.3% inflation rate, the breakeven point would be somewhere between the years 2014 and 2015 as it seen in the Figure IV.19.

When the C-130E/B values are taken optimistically, while C-130J data pessimistically with 5% inflation rate, the breakeven point would be beyond next 40 years.

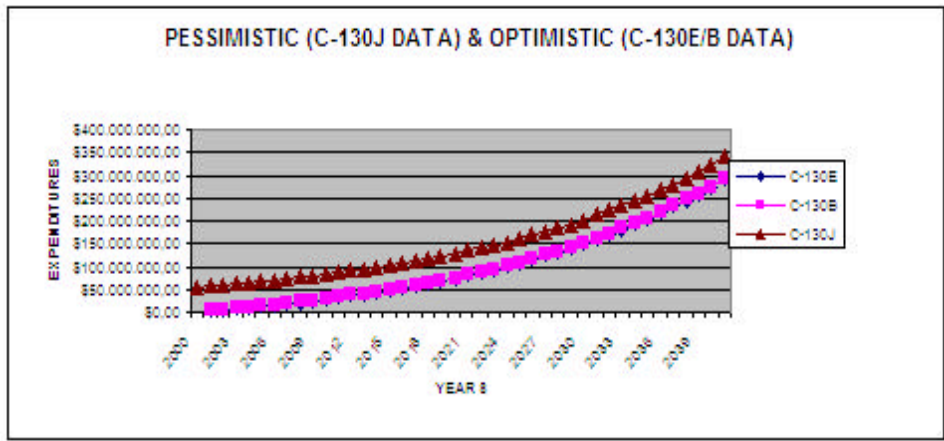


Figure IV.20. Sensitivity Analysis to the Pessimistic C-130J and Optimistic C-130E/B Data with 5% Inflation Rate

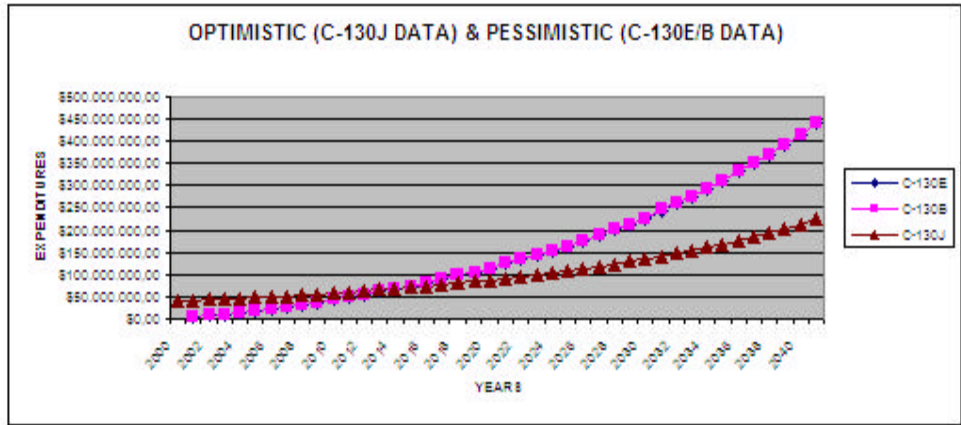


Figure IV.21. Sensitivity Analysis to the Optimistic C-130J and Pessimistic C-130E/B Data with 5% Inflation Rate

When the C-130E/B values are taken pessimistically, while C-130J data optimistically with 5% inflation rate, the breakeven point would be somewhere between the years 2013 and 2014 as it seen in the Figure IV.21.

While performing this analysis, it was considered that the inflation rate can be optimistic, while the rest of the representative data are pessimistic or vice versa. The sensitivity analysis for the inflation rate for pessimistic, average and optimistic representative data was applied.

When comparing the alternatives based on the cost figures, at first one of them may appear favorable, therefore it would be useful to see positions of the costs in the future in order to make a better decision. In this specific case, as it seen from the analysis, when the C-130J procurement cost is included into the sensitivity analysis, the breakeven point would change. Decision makers have to make their decisions about keeping the existing C-130 types, or buying C-130J considering the actual age of the existing C-130s, their reliabilities, technologies, and the air force vision.

Summary

In this chapter, the cost break down structure of O&S cost for C-130 aircraft was developed. All cost elements in the cost breakdown structure were defined and their allocation rationales were discussed. Most of the data related with the C-130E and C-130B are kept without discriminating the type of the aircraft that is why they were allocated between those types of aircraft based on their total numbers in the 222nd flight squadron.

Their O&S costs in the year 2000 were found, and shown in the Table IV.3. Based on the data, C-130J, which the data revealed in the Appendix J, has the lowest O&S cost, and C-130E is coming after it. Significant cost elements were fuel cost, overhaul cost, and reparable material cost.

Then sensitivity analysis was applied to the representative data which are overhaul costs, reparable material costs, flying hours, and modification kit costs for each type of the aircraft, so the O&S cost of each type of aircraft take their shape according to optimistic, pessimistic approach. In all cases, C-130J had the lowest O&S cost.

When, comparing the alternatives the breakeven analysis was required to make a better analysis about the future position of the cost figures, and the procurement cost of C-130J had to be included, as well as the sensitivity analysis of inflation rate.

Considering the market situations, and the discounts according to the amount bought, the sensitivity analysis was applied to all cost, and inflation figures. The summary of the breakeven points according to sensitivity analysis applied to the inflation rate and the optimistic, average, and pessimistic cost figures was shown in the Table IV.6.

Table IV.6. Summary of Breakeven Points

| | Optimistic | Average | Pessimistic |
|------|------------|-----------|-------------|
| 1.8% | 2033-2034 | 2032-2033 | 2032-2033 |
| 2.3% | 2031-2032 | 2030-2031 | 2029-2030 |
| 3.3% | 2027-2028 | 2027-2028 | 2026-2027 |
| 5% | 2023-2024 | 2023-2024 | 2023-2024 |

In addition to this, the reverse possibilities were also considered, in this research, C-130E and C-130B were considered to have similar reliabilities, while the C-130J was considered more reliable because of its age and technology. The optimistic and

pessimistic values of the aircraft might not be faced at the same time. The summary of the breakeven point for the reverse situations was shown in the Table IV.7.

Table IV.7. Summary of Breakeven Points for Reverse Situations

| | Optimistic C-130J Data with Pessimistic C-130E/B Data | Optimistic C-130E/B Data with Pessimistic C-130J Data |
|------|---|---|
| 1.8% | 2024-2025 | Beyond 40 Years |
| 2.3% | 2015-2016 | Beyond 40 Years |
| 3.3% | 2014-2015 | Beyond 40 Years |
| 5% | 2013-2014 | Beyond 40 Years |

The next chapter will present the conclusions of this study and the recommendations of the researcher.

V. Conclusions and Recommendations

Chapter Overview

There were six investigative questions presented in Chapter I, and four of them were already answered along with the analysis. In this chapter, the questions and their answers will be presented one more time. The last two questions will be answered here along with the conclusions and recommendation for future research.

Investigative Questions

1. What are the relevant costs to compare?

It was mentioned that the procurement costs of the C-130 E/B aircraft are considered to be sunk, since TUAf has already been operating C-130E and C-130Bs. The O&S cost was therefore the most significant cost in system or product life cycle. That is why O&S cost (labor costs of operating and maintenance personnel, fuel and power cost, operating and maintenance supply costs, spare and repair part costs, and related overhead costs) was considered to be valid for the cost aspect of this comparison. This question and operating and support cost breakdown structure (CBS) of C-130 aircraft that includes all relevant costs and their definitions along with the allocation rationale were presented in Chapter IV.

2. What is the best way to compare these costs?

The C-130 types were evaluated over 40 years in order to give a better idea to the decision makers to make their decision more accurate over long run. The cost elements were analyzed over 40 years by taking the year 2000 as a base year. Sensitivity analysis

was applied to representative data, C-130J procurement cost, and the inflation rate, in order to perform breakeven analysis. The analysis and the results were presented in Chapter IV.

3. What data would be needed to perform the comparison?

The main steps of CBS for O&S costs of the C-130 aircraft are presented in the “Operating and Support Cost Estimating Guide” issued by Office of the Secretary of Defense Cost Analysis Improvement Group (21:C-1). This was presented in Chapter IV. The CBS of the C-130 aircraft includes labor costs of operating and support personnel, fuel and power cost, operating and maintenance supply costs, spare and repair part costs. All data required was provided by the TUAf related to C-130E and C-130B aircraft, while the data, which were unique for C-130J, were obtained from the US sources. The data for C-130E and B gathered from the TUAf were revealed in the Appendix I, while C-130J data revealed in Appendix J.

4. What additional non-O&S cost factors would need to be considered?

Since the USA is one of the most important allied countries for Turkey, political factors were considered to be irrelevant for this thesis. Because of the declining budget and the major role of the TUAf on the region and the peacekeeping missions, the performance and the cost are deemed to be the relevant factors that would be considered. The cost factor appear to favor the C-130J for O&S cost. The technology is speeding, and the obsolete technology has to be replaced by the modern technologies sooner or later. In this specific case, capacity, speed, range, and landing range were appeared to be the non-cost factors as well as efficiency. The capacities of the aircraft are the same, while all other factors were favorable to the C-130J.

5. What recommendation should be made to the TUAf?

After analyzing the alternatives in terms of performance and cost, the most suitable alternative appeared to be C-130J. It should not be forgotten that LCC analysis would not be the final result for the decision makers. This would be one of the most important inputs for the decision makers while reaching the conclusion about the alternatives. Even after adding the procurement cost of C-130J, it reaches breakeven in 30 years averagely, relative to inflation rate and C-130J procurement cost.

6. What trade-offs exist in the decision?

After the analysis, it can be concluded that C-130J has the lowest O&S cost comparing to C-130E and C-130B. On the other hand since the TUAf already has C-130E and C-130B, the main consideration would be the procurement cost of C-130J. However, this should be considered in every replacement decision, in keep or buy decision, the decision makers have to consider the strategy of the TUAf, the missions, the reliability and the performance such as speed, range, and landing range.

Efficiency versus effectiveness would be the main consideration in this case. By keeping the existing C-130s, the TUAf can be efficient for short term when we consider the life of the aircraft over 40 years, in addition to this, it should not be forgotten that the existing aircraft have been serving for more than 40 years. So, it would not be realistic to expect them to serve for another 40 years. This would make decision makers consider the replacement of the existing C-130s. In this case, the procurement cost would be unavoidable.

Conclusions

Several important issues were identified during this research. They are not only related to the result of analysis, but also, the LCC process itself. The research showed that LCC analysis is vital for evaluating the alternatives in decision-making.

Conclusion 1

LCC Analysis showed that operating with existing C-130s is not feasible comparing to the C-130J model's O&S cost. This also showed that using LCC is useful to evaluate the cost aspect of the competing alternative systems, as well as replacing the existing systems. It also shows the inefficient areas that need to be improved in the operating and supporting activities. During the analysis, the cost figures and the percentage of those in the total O&S cost shows the analyst the important issues that have to be pointed to decision makers and the operators to improve the service.

Conclusion 2

After the analysis, it can be concluded that the newest version of C-130 aircraft (C-130J) has the lowest O&S cost when we compare it with C-130E and C-130B. When optimistic, average, and pessimistic data were utilized, it was seen that C-130J with its new propulsion systems, gives high efficiency in the operations. It also requires fewer crewmembers. So, the operation and support cost figure of C-130 J is smaller.

Conclusion 3

When the sensitivity analysis is applied to those cost figures, including the procurement cost of C-130J, it amortizes itself in the lifetime of the cargo airplane if everything is *ceteris paribus*.

Recommendation

In the analysis some data are representative, and more accurate and complete cost figures are needed. This can be achieved by implementing activity based costing. Activity based costs are based on assigning the cost figures to the systems in terms of the spent sources by those systems. Since there are a lot of allocation between the aircraft types and C-130 types, those cost data do not represent exact cost figures for the resources consumed those types of C-130 aircraft. If the organization wants to have more accurate O&S cost figure, it has to establish the database that keeps the resources consumed each type of aircraft. This will serve to evaluate the competing systems, in addition to this; will show the areas that are inefficient.

Recommendation for Further Research

In this research, the cost figures related to the O&S cost are investigated. The further research might be related to the cost benefit analysis of the systems. In this case, the performance of the systems will also be investigated as well as the cost figures. This will help to make trade-offs between the systems.

In addition to this, the economical life of the systems can be investigated. In ideal conditions, once the system is produced and operations begin, it is expected to be useful forever. This is not true in reality. Because of the deterioration and obsolescence of the systems or products, their useful life is limited. There might be increasing trends in O&S cost, and the economic life of the system can be a research subject.

Moreover, this research was aircraft to aircraft, without adjusting for any increased payload or effectiveness. Operators might be able hypothesize that the payload

of current air force can be carried by less C-130J, and might offer another approach to be more efficient and effective.

Finally, in this research, keep or buy decision was investigated. However, refurbishing existing C-130s have to be considered and then new suggestions can be given to the decision makers. Because of the high acquisition cost of C-130J is the negative side of the buying C-130J, if refurbishing existing C-130s is good enough to accomplish the targeted efficiency and effectiveness, then that decision has to be considered.

APPENDIX A. COST ESTIMATION OF MISSION PERSONNEL

| C-130 OPERATION AND SUPPORT COST ESTIMATION | | | | | | | | | | |
|---|---------|-------------|-----------------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| | C-130E | | C-130B | | C-130E | | C-130B | | C-130E | |
| | No Per. | Ann. Salary | Ann Salary (\$) | TOTAL | C-130E | perC-130E | C-130B | perC-130B | perC-130E | perC-130B |
| All Turkish Lira values 1000 | | | | | | | | | | |
| Allocation factor of costs for C-130E is total number of C-130E/(no of C-130E+no of C-130B) | | | | | | | | | | |
| Allocation factor for C-130E = 0.438461538 | | | | | | | | | | |
| Allocation factor for C-130B = 0.461538462 | | | | | | | | | | |
| 1.0 MISSION PERSONNEL | | | | | | | | | | |
| 1 Dollar = 1500 1000 TL | | | | | | | | | | |
| 1.1 OPERATION | | | | | | | | | | |
| Pilot | 1 | 7500000 | 5000 | 5000 | 2692,307692 | 384,6153846 | 2307,692308 | 384,6153846 | 385 | 385 |
| 2nd Lieutenant | 60 | 8500000 | 5666,666667 | 340000 | 183076,9231 | 26153,84615 | 158923,0769 | 26153,84615 | 26154 | 26154 |
| 1st Lieutenant | 33 | 9500000 | 6333,333333 | 209000 | 172638,4615 | 16076,92308 | 96461,53846 | 16076,92308 | 16077 | 16077 |
| Captain | 8 | 10500000 | 7000 | 56000 | 30163,84615 | 4307,692308 | 25846,15385 | 4307,692308 | 4308 | 4308 |
| Major | | | | | | | | | | |
| Navigator | | | | | | | | | | |
| 1st Lieutenant | 55 | 7200000 | 4800 | 264000 | 142153,8462 | 20307,69231 | 121846,1538 | 20307,69231 | 0 | 0 |
| Captain | 32 | 8000000 | 5333,333333 | 170666,6667 | 91897,4589 | 13128,20513 | 78769,23077 | 13128,20513 | 0 | 0 |
| Major | 1 | 9000000 | 6000 | 6000 | 3230,769231 | 461,5384615 | 2769,230769 | 461,5384615 | 0 | 0 |
| Flight engineer | | | | | | | | | | |
| 3rd Sergeant | 48 | 7000000 | 4666,666667 | 224000 | 120615,3846 | 17230,76923 | 103384,6154 | 17230,76923 | 0 | 0 |
| 2nd Sergeant | 54 | 8000000 | 5333,333333 | 268000 | 155076,9231 | 22133,84615 | 132923,0769 | 22133,84615 | 0 | 0 |
| 1st Sergeant | | | | | | | | | | |
| Loadmaster | | | | | | | | | | |
| 3rd Sergeant | 18 | 7000000 | 4666,666667 | 84000 | 45230,76923 | 6461,538462 | 38769,23077 | 6461,538462 | 6462 | 6462 |
| 2nd Sergeant | 26 | 8000000 | 5333,333333 | 138666,6667 | 74666,66667 | 10666,66667 | 64000 | 10666,66667 | 10667 | 10667 |
| 1st Sergeant | | | | | | | | | | |
| 1.2 MAINTENANCE | | | | | | | | | | |
| Officers | | | | | | | | | | |
| 2nd Lieutenant | 1 | 5500000 | 3666,666667 | 1288,288288 | 693,6936937 | 99,0990991 | 594,5945946 | 99,0990991 | 99,0990991 | 99,0990991 |
| 1st Lieutenant | 3 | 6000000 | 4000 | 4216,216216 | 2270,27027 | 324,3243243 | 1948,948946 | 324,3243243 | 324,324324 | 324,324324 |
| Captain | 4 | 7500000 | 5000 | 7027,027027 | 3763,763764 | 540,5405405 | 323,24243 | 540,5405405 | 540,54054 | 540,54054 |
| Major | 2 | 8500000 | 5666,666667 | 3981,981982 | 2144,144144 | 306,3063063 | 1837,837838 | 306,3063063 | 306,306306 | 306,306306 |
| NCOs | | | | | | | | | | |
| 3rd Sergeant | 171 | 4200000 | 2800 | 166227,027 | 90563,76376 | 12940,64054 | 77643,24324 | 12940,64054 | 12940,64054 | 12940,64054 |

**APPENDIX B. COST ESTIMATION OF 12th AIRLIFT MATERIAL
CONSUMPTION (OPTIMISTIC)**

| | | | | | | | | | |
|---|--------|---|--------|-----------|------------|------------|-------------|----------|--------|
| | C-130E | 7 | | | | | | | |
| | C-130B | 6 | | | | | | | |
| All Turkish Lit Values 1000 | | | | | | | | | |
| Allocation factor of costs for C-130E is total number of C-130E (no of C-130E+no of C-130B) | | | | | | | | | |
| Allocation factor for C-130E = $\frac{0.53846154}{0.46153846}$ | | | | | | | | | |
| Allocation factor for C-130B = $\frac{1 \text{ Dollar}}{1500 \text{ 1000 TL}}$ | | | | | | | | | |
| 2.0 12th AIRLIFT BASE MATERIAL CONSUMPTION | | | | | | | | | |
| 2.1 Fuel Lubricants and Energy | | | | | | | | | |
| 2.1.1 Fuel and Oil | | | | | | | | | |
| | | | Cost | | | | | | |
| Average flight hour | | | 500 | | | | | | |
| Libre per C-130E/B flight hour | | | 4500 | | | | | | |
| Libre per C-130J flight hour | | | 33.45 | | | | | | |
| Cost of fuel per libra | | | 0.4 | | | | | | |
| Per C-130E/B a libra/hr | | | 900000 | | | | | | |
| | | | | 11700000 | 6300000 | 900000 | 5400000 | 900000 | 669000 |
| | | | | | | | | | |
| | | | | | | | | | |
| Oil | | | | | | | | | |
| Gallon per hour | | | 1.2 | | | | | | |
| Cost of oil per gallon | | | 0.15 | | | | | | |
| Average flight hour | | | 500 | | | | | | |
| Per aircraft/hr | | | 90 | 1170 | 630 | 90 | 540 | 90 | 180 |
| | | | | | | | | | |
| 2.2.1 Maintenance Material | | | | | | | | | |
| Consumable Maintenance Material | | | | 46970.711 | 6710.10157 | 594.87.502 | 99.14.55356 | 32.50.32 | |
| | | | | | | | | | |
| Repairable Maintenance Material | | | | 10075000 | 5440500 | 777214.286 | 4634500 | 777214 | 306923 |

| | | | | | | | | | |
|--|-------------|--------|------------|------------|------------|------------|------------|---------|--|
| 2.1.2 Electricity | | | | | | | | | |
| Ann. base electric bill | 370884000 | | | | | | | | |
| Total C-130 Aircraft | 13 | | | | | | | | |
| Total C-160 Aircraft | 12 | | | | | | | | |
| Total CN-235 Aircraft | 12 | | | | | | | | |
| Allocation factor | 0.351351351 | | | | | | | | |
| Allocated cost | 86873,7297 | 247255 | 45778,1622 | 6862,59459 | 40395,5576 | 6832,59459 | 6832,59459 | 6832,59 | |
| 2.2.2 Mission Support Supplies | 33333,3333 | | 17948,7179 | 2554,10255 | 15384,6154 | 2554,10255 | | 2554,1 | |
| 2.2.3 Other Unit Level Consumption | 350000 | | 64427,8507 | 34691,925 | 4955,98523 | 29735,9357 | 4955,98523 | 4955,99 | |
| 222 Personnel | 370 | | | | | | | | |
| Total Personnel | 2010 | | | | | | | | |
| Allocation Factor For 222nd Fight Squadron | 0.184079602 | | | | | | | | |
| TOTAL | | | 11887519,5 | 1698217,07 | 10179749,8 | 1701421,27 | | 963556 | |

**APPENDIX B (contd). COST ESTIMATION OF 12th AIRLIFT MATERIAL
CONSUMPTION (AVERAGE)**

| | | | | | | | | | |
|--|--------------|-------------|---------------|-------------|---------------|-------------|---------------|-------------|-------------|
| | C-130E | 7 | | | | | | | |
| | C-130B | 6 | | | | | | | |
| All Turkish Lira values 1000 | | | | | | | | | |
| Allocation factor of 0.0818 for C-130E is total number of C-130E/(no. of C-130E+no. of C-130B) | | | | | | | | | |
| Allocation factor for C-130E = 0.838461538 | | | | | | | | | |
| Allocation factor for C-130B = 0.481538462 | | | | | | | | | |
| 1 Dollar = \$1,500, 1000 TL | | | | | | | | | |
| 2.0 12th AIRLIFT BASE MATERIAL CONSUMPTION | | | | | | | | | |
| 2.1 Fuel Lubricants and Energy | | | | | | | | | |
| 2.1.1 Fuel and Oil | | | | | | | | | |
| | Cost | | | | | | | | |
| Average flight hour | \$750.00 | | | | | | | | |
| Litres per C-130E B flight hour | \$4,500.00 | | | | | | | | |
| Litres per C-130U flight hour | \$3,345.00 | | | | | | | | |
| Cost of fuel per litre | \$0.40 | | | | | | | | |
| Per C-130E B aircraft hr | \$1,350,000 | \$9,450,000 | \$1,350,000 | \$8,100,000 | \$1,350,000 | \$8,100,000 | \$1,350,000 | \$8,100,000 | \$1,003,500 |
| Oil | | | | | | | | | |
| Gallon per hour | \$1.20 | | | | | | | | |
| Cost of oil per gallon | \$0.15 | | | | | | | | |
| Average flight hour | \$750.00 | | | | | | | | |
| Per aircraft hr | \$135.00 | \$945.00 | \$135.00 | \$810.00 | \$135.00 | \$810.00 | \$135.00 | \$810.00 | \$160.00 |
| 2.2.1 Maintenance Material | | | | | | | | | |
| Consumable Maintenance Material | \$46,970.71 | \$6,710.10 | \$59,487.50 | \$9,914.58 | \$3,260.32 | \$59,487.50 | \$9,914.58 | \$3,260.32 | |
| Repairable Maintenance Material | \$110,500.00 | \$967,000 | \$8,242,871.4 | \$0,000.00 | \$8,242,871.4 | \$0,000.00 | \$8,242,871.4 | \$0,000.00 | \$0,000.00 |

| | | | | | | | | | |
|---------------------------------------|------------------|-------------|-------------|-------------|-------------|-------------|-------------|---------|--|
| 2.1.2 Electricity | | | | | | | | | |
| Ann. base electric bill | \$370,884,000.00 | | | | | | | | |
| Total C-130 Aircraft | \$13,000 | | | | | | | | |
| Total C-160 Aircraft | \$12,000 | | | | | | | | |
| Total CV-235 Aircraft | \$12,000 | | | | | | | | |
| Allocation factor | \$0.35 | | | | | | | | |
| Allocated cost | \$86,873.73 | 2,47256 | 46778,16216 | 6682,594595 | 40095,56757 | 6682,594595 | 6682,594595 | 6682,59 | |
| 2.2.2 Mission Support Supplies | 33333.33333 | | | | | | | | |
| 2.2.3 Other Unit Level Consumption | | | | | | | | | |
| 222 Personnel | 370 | | | | | | | | |
| Total Personnel | 2010 | | | | | | | | |
| Allocation Factor For 222nd Flight Sq | 0.184079502 | | | | | | | | |
| TOTAL | | 15564,33452 | 2203476,359 | 13328513,62 | 2228680,842 | 1328056 | | | |

**APPENDIX B (contd). COST ESTIMATION OF 12th AIRLIFT MATERIAL
CONSUMPTION (PESSIMISTIC)**

| | | | | | | |
|---|-----------|------------|------------|------------|------------|---------|
| | C-130E | 7 | | | | |
| | C-130B | 6 | | | | |
| All Turkish Lira values 1000 | | | | | | |
| Allocation factor of costs for C-130E is total number of C-130E/(no of C-130E+no of C-130B) | | | | | | |
| Allocation factor for C-130E = $\frac{0.53846154}{0.46153846}$ | | | | | | |
| Allocation factor for C-130B = $\frac{1500}{1000}$ TL | | | | | | |
| 1 Dollar = 1500 1000 TL | | | | | | |
| 2.0 12th AIRLIFT BASE MATERIAL CONSUMPTION | | | | | | |
| 2.1 Fuel Lubricants and Energy | | | | | | |
| 2.1.1 Fuel and Oil | | | | | | |
| | Cost | | | | | |
| Average flight hour | 1000 | | | | | |
| Libre per C-130E/B flight hour | 4500 | | | | | |
| Libre per C-130J flight hour | 3345 | | | | | |
| Cost of fuel per libra | 0,4 | | | | | |
| Per C-130E/B aircraft/hr | 1800000 | 12500000 | 1800000 | 10800000 | 1800000 | 1338000 |
| Oil | | | | | | |
| Galon per hour | 1,2 | | | | | |
| Cost of oil per galon | 0,15 | | | | | |
| Average flight hour | 1000 | | | | | |
| Per aircraft/hr | 180 | 2340 | 1260 | 180 | 1080 | 180 |
| 2.2.1 Maintenance Material | | | | | | |
| Consumable Maintenance Material | 46970,711 | 6710,10157 | 59487,502 | 9914,58966 | 3250,32 | |
| Reparable Maintenance Material | 12025000 | 6493500 | 927642,857 | 5531500 | 927642,857 | 308923 |

| | | | | | | | | | |
|------------------------------------|-------------|------------|------------|------------|------------|------------|---------|--|--|
| 2.1.2 Electricity | | | | | | | | | |
| Ann. base electric bill | 370894000 | | | | | | | | |
| Total C-130 Aircraft | 13 | | | | | | | | |
| Total C-160 Aircraft | 12 | | | | | | | | |
| Total CN-235 Aircraft | 12 | | | | | | | | |
| Allocation factor | 0.351351351 | | | | | | | | |
| Allocated cost | 88873,7297 | 247258 | 48778,1622 | 8882,59459 | 40095,5876 | 8882,59459 | 8882,59 | | |
| 2.2.2 Mission Support Supplies | 3333,33333 | 17948,7179 | 2554,10258 | 15384,6154 | 2554,10258 | 2554,1 | | | |
| 2.2.3 Other Unit Level Consumption | 350000 | 64427,8607 | 34891,325 | 4955,88928 | 28735,9357 | 4955,88928 | 4955,99 | | |
| 222 Personnel | 370 | | | | | | | | |
| Total Personnel | 2010 | | | | | | | | |
| Allocation Factor For 222nd Figh | 0,184078602 | | | | | | | | |
| TOTAL | | 19241149,5 | 2748735,85 | 16477283,8 | 2751940,13 | 1662558 | | | |

APPENDIX C. C-130 CONSUMABLE MATERIAL LIST

| C-130E CONSUMABLE MATERIALS | | | | | |
|------------------------------------|------------------|-------------|-----------------|--------------|------------------|
| S/N | STOCK NO | PRICE | QUARTERLY USAGE | ANNUAL USAGE | TOTAL PRICE |
| 1 | 1560XXXXXXXX00LG | 0,00005 | | 269 | 1076 0,012622915 |
| 2 | 1560XXXXXXXX56LG | 0,000151767 | | 38 | 152 0,005767133 |
| 3 | 1650XXXXXXXX665 | 3 | | 56 | 224 149,3333333 |
| 4 | 1650XXXXXXXX060 | 2,78 | | 21 | 84 58,38 |
| 5 | 1650XXXXXXXX430 | 2,63 | | 21 | 84 55,23 |
| 6 | 1650XXXXXXXX0LE | 39,79 | | 43 | 172 1710,97 |
| 7 | 1670XXXXXXXXILG | 0,000146667 | | 14 | 56 0,002053333 |
| 8 | 2840XXXXXXXX709 | 30,05 | | 27 | 108 811,35 |
| 9 | 2915XXXXXXXX90 | 36,88 | | 13 | 52 479,44 |
| 10 | 2915XXXXXXXX8RW | 16,05 | | 51 | 204 818,55 |
| 11 | 2940XXXXXXXX58 | 3,8 | | 30 | 120 114 |
| 12 | 2945XXXXXXXX384 | 21,82 | | 12 | 48 261,84 |
| 13 | 4020XXXXXXXX334 | 10,07 | | 2 | 8 20,14 |
| 14 | 4330XXXXXXXX593 | 2,51 | | 4 | 16 10,04 |
| 15 | 4330XXXXXXXX274 | 2,42 | | 16 | 64 38,72 |
| 16 | 4330XXXXXXXX013 | 37,96 | | 22 | 88 835,12 |
| 17 | 4730XXXXXXXX7SX | 166,1 | | 11 | 44 1827,1 |
| 18 | 4935XXXXXXXX425 | 11 | | 2 | 8 21,33333333 |
| 19 | 5305XXXXXXXX902 | 0,42 | | 356 | 1424 149,52 |
| 20 | 5310XXXXXXXX406 | 2,8 | | 20 | 80 56 |
| 21 | 5315XXXXXXXX873 | 9,25 | | 84 | 336 777 |
| 22 | 5315XXXXXXXX359 | 2,02 | | 500 | 2000 1010 |
| 23 | 5315XXXXXXXX274 | 0,14 | | 191 | 764 26,74 |
| 24 | 5315XXXXXXXX566 | 0,68 | | 55 | 220 37,4 |
| 25 | 5330XXXXXXXX759 | 0,00007616 | | 139 | 556 0,01058624 |
| 26 | 5330XXXXXXXX790 | 0,667 | | 50 | 200 33,33333333 |
| 27 | 5330XXXXXXXX032 | 322 | | 12 | 48 3864 |
| 28 | 5330XXXXXXXX462 | 1,063333333 | | 19 | 76 20,20333333 |
| 29 | 5330XXXXXXXX525 | 0,08 | | 4 | 16 0,32 |
| 30 | 5330XXXXXXXX527 | 500 | | 32 | 128 16000 |
| 31 | 5330XXXXXXXX006 | 35,29 | | 5 | 20 176,45 |
| 32 | 5330XXXXXXXX345 | 47,5 | | 28 | 112 1330 |
| 33 | 5330XXXXXXXX310 | 0,00038 | | 5 | 20 0,0019 |
| 34 | 5330XXXXXXXX898 | 200 | | 5 | 20 1000 |
| 35 | 5331XXXXXXXX331 | 61 | | 14 | 56 854 |
| 36 | 5331XXXXXXXX174 | 15 | | 5 | 20 75 |
| 37 | 5331XXXXXXXX278 | 50 | | 16 | 64 800 |
| 38 | 5331XXXXXXXX607 | 0,0005 | | 16 | 64 0,008 |
| 39 | 5331XXXXXXXX633 | 50 | | 5 | 20 250 |
| 40 | 5331XXXXXXXX262 | 10,1 | | 18 | 72 181,8 |
| 41 | 5340XXXXXXXX90SX | 0,1 | | 488 | 1952 48,8 |
| 42 | 5340XXXXXXXX31SX | 0,11 | | 744 | 2976 81,84 |
| 43 | 5342XXXXXXXX68SX | 4,23 | | 9 | 36 38,07 |
| 44 | 5355XXXXXXXX40SX | 7,67 | | 13 | 52 99,71 |
| 45 | 5355XXXXXXXX138 | 20,7 | | 36 | 144 745,2 |
| 46 | 5930XXXXXXXX67SX | 559,44 | | 14 | 56 7832,16 |
| 47 | 5930XXXXXXXX290 | 222,27 | | 1 | 4 222,27 |
| 48 | 5930XXXXXXXX3SX | 631,29 | | 1 | 4 631,29 |
| 49 | 5935XXXXXXXX174 | 7,37 | | 10 | 40 73,7 |
| 50 | 5940XXXXXXXX370 | 0,24 | | 13 | 52 3,12 |

| | | | | | |
|----|----------------|-------------|-----|-----|-------------|
| 51 | 5975XXXXXX284 | 0,666666667 | 188 | 752 | 125,3333333 |
| 52 | 6220XXXXXX797 | 9,5 | 4 | 16 | 38 |
| 53 | 6220XXXXXX244 | 11,35 | 13 | 52 | 147,55 |
| 54 | 6240XXXXXX784 | 0,32 | 77 | 308 | 24,64 |
| 55 | 6240XXXXXX824 | 1,13 | 146 | 584 | 164,98 |
| 56 | 6240XXXXXX848 | 0,23 | 128 | 512 | 29,44 |
| 57 | 6240XXXXXX518 | 8,37 | 5 | 20 | 41,85 |
| 58 | 6240XXXXXX094 | 22,27 | 1 | 4 | 22,27 |
| 59 | 6240XXXXXX48SX | 4,66 | 39 | 156 | 181,74 |
| 60 | 6240XXXXXX757 | 1,342666667 | 12 | 48 | 16,112 |
| 61 | 6340XXXXXX289 | 188,84 | 1 | 4 | 188,84 |
| 62 | 6685XXXXXX564 | 328,61 | 1 | 4 | 328,61 |
| 63 | 6685XXXXXX46NT | 339,07 | 5 | 20 | 1695,35 |
| 64 | 6850XXXXXX188 | 17,83 | 16 | 64 | 285,28 |
| 65 | 9150XXXXXX860 | 0,000153333 | 9 | 36 | 0,00138 |
| 66 | 9505XXXXXX175 | 5,12 | 10 | 40 | 51,2 |

46970,71098

C-130B CONSUMABLE MATERIALS

| S/N | STOCK NO | PRICE | QUARTERLY USAGE | ANNUAL USAGE | TOTAL PRICE |
|-----|----------------|-------------|-----------------|--------------|-------------|
| 1 | 1560XXXXXX00LG | 0,00005 | 371 | 1484 | 0,017409299 |
| 2 | 1560XXXXXX56LG | 0,000151767 | 57 | 228 | 0,0086507 |
| 3 | 1650XXXXXX665 | 3 | 65 | 260 | 173,3333333 |
| 4 | 1650XXXXXX060 | 2,78 | 32 | 128 | 88,96 |
| 5 | 1650XXXXXX430 | 2,63 | 35 | 140 | 92,05 |
| 6 | 1650XXXXXX0LE | 39,79 | 87 | 348 | 3461,73 |
| 7 | 1670XXXXXX1ILG | 0,000146667 | 9 | 36 | 0,00132 |
| 8 | 2840XXXXXX709 | 30,05 | 34 | 136 | 1021,7 |
| 9 | 2915XXXXXX90 | 36,88 | 19 | 76 | 700,72 |
| 10 | 2915XXXXXX8RW | 16,05 | 58 | 232 | 930,9 |
| 11 | 2940XXXXXX58 | 3,8 | 41 | 164 | 155,8 |
| 12 | 2945XXXXXX384 | 21,82 | 22 | 88 | 480,04 |
| 13 | 4020XXXXXX334 | 10,07 | 9 | 36 | 90,63 |
| 14 | 4330XXXXXX593 | 2,51 | 3 | 12 | 7,53 |
| 15 | 4330XXXXXX274 | 2,42 | 14 | 56 | 33,88 |
| 16 | 4330XXXXXX013 | 37,96 | 28 | 112 | 1062,88 |
| 17 | 4730XXXXXX7SX | 166,1 | 14 | 56 | 2325,4 |
| 18 | 4935XXXXXX425 | 11 | 8 | 32 | 85,33333333 |
| 19 | 5305XXXXXX902 | 0,42 | 222 | 888 | 93,24 |
| 20 | 5310XXXXXX406 | 2,8 | 16 | 64 | 44,8 |
| 21 | 5315XXXXXX873 | 9,25 | 92 | 368 | 851 |
| 22 | 5315XXXXXX359 | 2,02 | 750 | 3000 | 1515 |
| 23 | 5315XXXXXX274 | 0,14 | 175 | 700 | 24,5 |
| 24 | 5315XXXXXX566 | 0,68 | 92 | 368 | 62,56 |
| 25 | 5330XXXXXX759 | 0,00007616 | 196 | 784 | 0,01492736 |
| 26 | 5330XXXXXX790 | 0,667 | 42 | 168 | 28 |
| 27 | 5330XXXXXX032 | 322 | 14 | 56 | 4508 |
| 28 | 5330XXXXXX462 | 1,063333333 | 28 | 112 | 29,77333333 |
| 29 | 5330XXXXXX525 | 0,08 | 9 | 36 | 0,72 |
| 30 | 5330XXXXXX527 | 500 | 45 | 180 | 22500 |
| 31 | 5330XXXXXX006 | 35,29 | 8 | 32 | 282,32 |
| 32 | 5330XXXXXX345 | 47,5 | 32 | 128 | 1520 |
| 33 | 5330XXXXXX310 | 0,00038 | 19 | 76 | 0,00722 |
| 34 | 5330XXXXXX898 | 200 | 4 | 16 | 800 |
| 35 | 5331XXXXXX331 | 61 | 17 | 68 | 1037 |
| 36 | 5331XXXXXX174 | 15 | 7 | 28 | 105 |
| 37 | 5331XXXXXX278 | 50 | 20 | 80 | 1000 |

| | | | | | |
|----|-----------------|-------------|-----|------|--------------------|
| 38 | 5331XXXXXX607 | 0,0005 | 5 | 20 | 0,0025 |
| 39 | 5331XXXXXX633 | 50 | 7 | 28 | 350 |
| 40 | 5331XXXXXX262 | 10,1 | 14 | 56 | 141,4 |
| 41 | 5340XXXXXXX90SX | 0,1 | 322 | 1288 | 32,2 |
| 42 | 5340XXXXXXX31SX | 0,11 | 525 | 2100 | 57,75 |
| 43 | 5342XXXXXXX68SX | 4,23 | 10 | 40 | 42,3 |
| 44 | 5355XXXXXXX40SX | 7,67 | 16 | 64 | 122,72 |
| 45 | 5355XXXXXXX138 | 20,7 | 31 | 124 | 641,7 |
| 46 | 5930XXXXXXX67SX | 559,44 | 14 | 56 | 7832,16 |
| 47 | 5930XXXXXXX290 | 222,27 | 0 | 0 | 0 |
| 48 | 5930XXXXXXX3SX | 631,29 | 2 | 8 | 1262,58 |
| 49 | 5935XXXXXXX174 | 7,37 | 17 | 68 | 125,29 |
| 50 | 5940XXXXXXX370 | 0,24 | 25 | 100 | 6 |
| 51 | 5975XXXXXXX284 | 0,66666667 | 250 | 1000 | 166,666667 |
| 52 | 6220XXXXXXX797 | 9,5 | 3 | 12 | 28,5 |
| 53 | 6220XXXXXXX244 | 11,35 | 16 | 64 | 181,6 |
| 54 | 6240XXXXXXX784 | 0,32 | 58 | 232 | 18,56 |
| 55 | 6240XXXXXXX824 | 1,13 | 122 | 488 | 137,86 |
| 56 | 6240XXXXXXX848 | 0,23 | 138 | 552 | 31,74 |
| 57 | 6240XXXXXXX518 | 8,37 | 7 | 28 | 58,59 |
| 58 | 6240XXXXXXX094 | 22,27 | 3 | 12 | 66,81 |
| 59 | 6240XXXXXXX48SX | 4,66 | 27 | 108 | 125,82 |
| 60 | 6240XXXXXXX757 | 1,34266667 | 19 | 76 | 25,5106667 |
| 61 | 6340XXXXXXX289 | 188,84 | 1 | 4 | 188,84 |
| 62 | 6685XXXXXXX564 | 328,61 | 1 | 4 | 328,61 |
| 63 | 6685XXXXXXX46NT | 339,07 | 6 | 24 | 2034,42 |
| 64 | 6850XXXXXXX188 | 17,83 | 18 | 72 | 320,94 |
| 65 | 9150XXXXXXX860 | 0,000153333 | 17 | 68 | 0,002606667 |
| 66 | 9505XXXXXXX175 | 5,12 | 9 | 36 | 46,08 |
| | | | | | 59487,50197 |

Consumable Maintenance Material

C-130E per C-130E
\$46.970,71 \$6.710,10

C-130B per C-130B
59487,50197 9914,583661

**APPENDIX D. COST ESTIMATION OF DEPOT LEVEL MAINTENANCE
(OPTIMISTIC)**

C-130E 7
 C-130B 6
 All Dollar values 1000
 Allocation factor of costs for C-130E is total number of C-130E (no of C-130E/no of C-130B)
 Allocation factor for C-130E = 0.638461538
 Allocation factor for C-130B = 0.461538462
 1 Dollar = 1500 1000 TL

| 4.0 Depot Level Maintenance | | C-130E | per C-130E | C-130B | per C-130B | per C-130B | per C-130B |
|-----------------------------|----------|-------------------|------------|-------------|-------------|-------------|-------------|
| 4.1 Overhaul | | 3500000 | 500000 | 3000000 | 500000 | 500000 | 2500000 |
| 4.2 Other | | | | | | | |
| Direct Personnel | No. Per. | Annual Salary(\$) | TOTAL | | | | |
| Officer | | | | | | | |
| Major | 1 | 8500000 | 8500000 | 3051,282051 | 435,8974359 | 2615,384615 | 435,8974359 |
| Captain | 1 | 8000000 | 8000000 | 2871,794972 | 410,2564103 | 2461,538462 | 410,2564103 |
| 1st Lt. | 1 | 7000000 | 7000000 | 2512,820513 | 358,974359 | 2153,846154 | 358,974359 |
| NCO | | | | | | | |
| 3rd Sergeant | 4 | 4200000 | 16800000 | 6030,789231 | 881,5394615 | 5189,230769 | 881,5394615 |
| 2nd Sergeant | 3 | 4800000 | 14400000 | 5169,230769 | 738,4615385 | 4430,789231 | 738,4615385 |
| 1st Sergeant | 3 | 7000000 | 21000000 | 7538,461538 | 1076,923077 | 6461,538462 | 1076,923077 |
| Engineer | 5 | 12000000 | 60000000 | 21538,46154 | 3076,923077 | 18461,53846 | 3076,923077 |
| Technician | 15 | 9600000 | 144000000 | 51692,30769 | 7384,615385 | 44307,89231 | 7384,615385 |
| Civilian Labor | 48 | 7800000 | 37440000 | 134400 | 15200 | 119200 | 19200 |

**APPENDIX D (contd). COST ESTIMATION OF DEPOT LEVEL
MAINTENANCE (PESSIMISTIC)**

| | |
|---|--------------|
| C-130E | 7 |
| C-130B | 8 |
| All Dollar values 1000 | |
| Allocation factor of costs for C-130E is total number of C-130E/(no of C-130E+no of C-130B) | |
| Allocation factor for C-130E = | 0.53846154 |
| Allocation factor for C-130B = | 0.46153846 |
| 1 Dollar = | 1500 1000 TL |

| | | | | | |
|-----------------------------|---------|------------|---------|------------|------------|
| 4.0 Depot Level Maintenance | C-130E | per C-130E | C-130B | per C-130B | per C-130J |
| 4.1 Overhaul | 7000000 | 1000000 | 6000000 | 1000000 | 750000 |

| | | | |
|------------------|---------|-------------------|-------------|
| 4.2 Other | | Annual Salary(\$) | TOTAL |
| Direct Personnel | No Per. | | |
| Officer | | | |
| Major | 1 | 5666,666667 | 5666,666667 |
| Captain | 1 | 5333,333333 | 5333,333333 |
| 1st Lt. | 1 | 4666,666667 | 4666,666667 |
| NCO | | | |
| 3rd Sergeant | 4 | 11200 | 6030,76923 |
| 2nd Sergeant | 3 | 480000 | 5159,23077 |
| 1st Sergeant | 3 | 700000 | 738,461538 |
| Engineer | 5 | 1200000 | 4430,76923 |
| Technician | 15 | 960000 | 51692,3077 |
| Civilian Labor | 48 | 7800000 | 134400 |
| | | 5200 | 249600 |
| | | 11200 | 6030,76923 |
| | | 9600 | 5159,23077 |
| | | 14000 | 738,461538 |
| | | 4000 | 4430,76923 |
| | | 96000 | 51692,3077 |
| | | 19200 | 115200 |
| | | 861,538462 | 861,538462 |
| | | 738,461538 | 738,461538 |
| | | 1076,92308 | 1076,92308 |
| | | 3076,92308 | 3076,92308 |
| | | 7384,61538 | 7384,61538 |
| | | 19200 | 19200 |

**APPENDIX E. COST ESTIMATION OF SUSTAINING
SUPPORT(OPTIMISTIC)**

| | | | |
|---|----------------------------------|------------|--|
| | C-130E | 7 | |
| All Dollar values 1000 | C-130B | 6 | |
| Allocation factor of costs for C-130E is total number of C-130E (no of C-130E+no of C-130B) | | | |
| Allocation factor for C-130E = | 0.53846154 | | |
| Allocation factor for C-130B = | 0.46153846 | | |
| 1 Dollar = | 1500 | 1000 | TL |
| 6.0 Sustaining Support | | | |
| 6.1 Support Equipment Replacement | | | |
| | C-130 AIRCRAFT EQUIPMENTS | | |
| S/N | STOCK NO | PRICE | No. Equip. TOTAL |
| 1 | 6115XXXXXX486 | 241643 | 10 2416430 |
| 2 | 1740XXXXXX287 | 32102 | 5 160510 |
| 3 | 1730XXXXXX439 | 3630 | 20 72600 |
| 4 | 2320XXXXXX709 | 269000 | 4 1076000 |
| 5 | 3655XXXXXX062 | 50719 | 4 202876 |
| 6 | 3655XXXXXX943 | 17506 | 4 70024 |
| 7 | 1650XXXXXX323 | 8500 | 5 42500 |
| 8 | 4910XXXXXX124 | 16727.4667 | 3 50182.4 |
| 9 | 1730XXXXXX969 | 40000 | 3 120000 |
| 10 | 6230XXXXXX804 | 6500 | 5 32500 |
| 11 | 4520XXXXXX789 | 1500.24 | 20 30004.8 |
| 12 | 1740XXXXXX561 | 50000 | 4 200000 |
| 13 | 4310XXXXXX653 | 3502 | 20 70040 |
| | | | 4543667.2 |
| | | | C-130 C-130E per C-130E C-130B per C-130B per C-130E per C-130B |
| | | | 1596423.61 859612.714 122801.816 736610.697 122801.816 122801.82 |
| | | | 13 |
| Total C-130 Aircraft | | | 390000 |
| Total C-150 Aircraft | | | 210000 |
| Total C/N-235 Aircraft | | | 30000 |
| Allocation factor | | | 0.35135135 |
| 6.2 Modification Kit | | | 180000 |
| | | | 30000 |
| | | | 10000 |

**APPENDIX E (contd). COST ESTIMATION OF SUSTAINING SUPPORT
(AVERAGE)**

| | | |
|---|------------|---------|
| | C-130E | 7 |
| | C-130B | 6 |
| All Dollar values 1000 | | |
| Allocation factor for C-130E (is total number of C-130E (no of C-130E+no of C-130B) | | |
| Allocation factor for C-130E = | 0.53846154 | |
| Allocation factor for C-130B = | 0.46153846 | |
| 1 Dollar = | 1500 | 1000 TL |

| | | | | | |
|-----------------------------------|----------------|------------|------------|------------|--|
| 6.0 Sustaining Support | | | | | |
| 6.1 Support Equipment Replacement | | | | | |
| C-130 AIRCRAFT EQUIPMENTS | | | | | |
| S/N | STOCK NO | PRICE | No. Equip. | TOTAL | |
| 1 | 16115XXXXXX486 | 241643 | 10 | 2416430 | |
| 2 | 1740XXXXXX287 | 32102 | 5 | 160510 | |
| 3 | 1730XXXXXX439 | 3630 | 20 | 72600 | |
| 4 | 2320XXXXXX709 | 269000 | 4 | 1076000 | |
| 5 | 3655XXXXXX062 | 50719 | 4 | 202876 | |
| 6 | 3655XXXXXX943 | 17506 | 4 | 70024 | |
| 7 | 1650XXXXXX323 | 8500 | 5 | 42500 | |
| 8 | 4910XXXXXX124 | 16727,4667 | 3 | 50182,4 | |
| 9 | 1730XXXXXX959 | 40000 | 3 | 120000 | |
| 10 | 6230XXXXXX804 | 6500 | 5 | 32500 | |
| 11 | 4520XXXXXX789 | 1500,24 | 20 | 30004,8 | |
| 12 | 1740XXXXXX561 | 50000 | 4 | 200000 | |
| 13 | 4310XXXXXX653 | 3502 | 20 | 70040 | |
| | | | | 4543667,2 | |
| | | | | C-130 | |
| | | | | 1596423,61 | |
| | | | | 859612,714 | |
| | | | | 122801,816 | |
| | | | | 736810,697 | |
| | | | | 122801,816 | |
| | | | | 122801,82 | |
| | | | | per C-130E | |
| | | | | per C-130B | |
| | | | | per C-130J | |

| | | | | | |
|-----------------------|------------|--|--|--|--|
| Total C-130 Aircraft | 13 | | | | |
| Total C-160 Aircraft | 12 | | | | |
| Total CN-235 Aircraft | 12 | | | | |
| Allocation factor | 0.35135135 | | | | |

| | | | | | |
|----------------------|--------|--------|-------|--------|-------|
| 6.2 Modification Kit | | | | | |
| | 455000 | 245000 | 35000 | 210000 | 35000 |
| | | | | | 15000 |

**APPENDIX E (contd). COST ESTIMATION OF SUSTAINING SUPPORT
(PESSIMISTIC)**

| | | | |
|--|-------------------------|------------|--|
| | C-130E | 7 | |
| All Dollars values 1000 | C-130B | 6 | |
| Allocation factor for C-130E is total number of C-130E/(no of C-130E+no of C-130B) | 0.53846154 | | |
| Allocation factor for C-130E = | 0.46153846 | | |
| Allocation factor for C-130B = | 1 Dollar = | 1500 | 1000 TL |
| 6.0 Sustaining Support | | | |
| 6.1 Support Equipment Replacement | | | |
| C-130 AIRCRAFT EQUIPMENTS | | | |
| S/N | STOCK NO | PRICE | No. Equip. TOTAL |
| | 1 6115XX XXXX486 | 241643 | 10 2416430 |
| | 2 1740XX XXXX287 | 32102 | 5 160510 |
| | 3 1730XX XXXX439 | 3630 | 20 72600 |
| | 4 2320XX XXXX709 | 269000 | 4 1076000 |
| | 5 3655XX XXXX062 | 50719 | 4 202876 |
| | 6 3655XX XXXX943 | 17506 | 4 70024 |
| | 7 1650XX XXXX323 | 8500 | 5 42500 |
| | 8 4910XX XXXX124 | 16727,4667 | 3 50182.4 |
| | 9 1730XX XXXX969 | 40000 | 3 120000 |
| | 10 6230XX XXXX804 | 6500 | 5 32500 |
| | 11 4520XX XXXX789 | 1500.24 | 20 30004.8 |
| | 12 1740XX XXXX561 | 50000 | 4 200000 |
| | 13 4310XX XXXX653 | 3502 | 20 70040 |
| | | | 4543667.2 |
| | | | C-130 C-130E per C-130E C-130B per C-130B per C-130J |
| | | | 1596423.61 859612.714 122801.8162 736610.6973 122801.816 122801.82 |
| | Total C-130 Aircraft | 13 | |
| | Total C-160 Aircraft | 12 | |
| | Total C-N-23.5 Aircraft | 12 | |
| | Allocation factor | 0.35135135 | |
| 6.2 Modification Kit | | | |
| | | 520000 | 280000 |
| | | 40000 | 240000 |
| | | 40000 | 40000 |
| | | | 20000 |

APPENDIX F. COST ESTIMATION OF INDIRECT SUPPORT

| | | | | | | | |
|---|------------|-------|--------|------------|------------|------------|------------|
| | C-130E | 7 | | | | | |
| All Dollar values 1000 | C-130B | 6 | | | | | |
| Allocation factor of costs for C-130E is total number of C-130E/(no of C-130E+no of C-130B) | | | | | | | |
| Allocation factor for C-130E = | 0.53846154 | | | | | | |
| Allocation factor for C-130B = | 0.46153846 | | | | | | |
| 1 Dollar = | 1500 | 1000 | TL | | | | |
| 7.0 Indirect Support | | | | | | | |
| 7.1 Personnel Support | | | | | | | |
| 7.1.1 Specialty Training | | | | | | | |
| 7.1.2 Medical Support | | | | | | | |
| | 12th AirmB | C-130 | C-130E | per C-130E | C-130B | per C-130B | per C-130J |
| C-130E | | | 250000 | 39565.2969 | 21315.1599 | 3045.02284 | 18270.137 |
| C-130B | | | | | | 3045.02284 | 1827.0137 |
| Allocation factor C-130E | | | | | | | |
| | | | | | | | |
| Allocation factor C-130B | | | | | | | |
| | | | | | | | |
| 222 flight Squad. | | | | | | | |
| 12th AirmB Base | | | | | | | |
| 7.2 Installation Support | | | | | | | |
| | | | 725000 | 254729.73 | 137162.162 | 19594.5946 | 117567.568 |
| Total C-130 Aircraft | | | | | | 19594.5946 | 19594.5946 |
| Total C-160 Aircraft | | | | | | | |
| Total CN-235 Aircraft | | | | | | | |
| Allocation factor | | | | | | | |
| C-130E | | | | | | | |
| C-130B | | | | | | | |
| Allocation factor C-130E | | | | | | | |
| Allocation factor C-130B | | | | | | | |

APPENDIX G. THE COMPUTATION OF CONSTANT YEAR DOLLARS

| CONSTANT INFLATION | | OPTIMISTIC INFLATION | PESSIMISTIC INFLATION | PESSIMISTIC INFLATION | | | |
|--------------------|-------|-------------------------|-----------------------|-------------------------|----------------------|-------------------------|----------------------|
| INF. RATE FOR 2001 | 0,023 | INF. RATE FOR 2002-2030 | 0,018 | INF. RATE FOR 2002-2030 | 0,033 | INF. RATE FOR 2002-2030 | 0,05 |
| YEAR | i | CONSTANT YEAR DOLLAR | CONSTANT YEAR DOLLAR | CONSTANT YEAR DOLLAR | CONSTANT YEAR DOLLAR | CONSTANT YEAR DOLLAR | CONSTANT YEAR DOLLAR |
| 2000 | | 1 | | | | | |
| 2001 | 1 | 1,023 | 1,023 | 1,023 | | 1,023 | |
| 2002 | 2 | 1,047 | 1,036 | 1,067 | | 1,103 | |
| 2003 | 3 | 1,071 | 1,055 | 1,102 | | 1,158 | |
| 2004 | 4 | 1,095 | 1,074 | 1,139 | | 1,216 | |
| 2005 | 5 | 1,120 | 1,093 | 1,176 | | 1,276 | |
| 2006 | 6 | 1,146 | 1,113 | 1,215 | | 1,340 | |
| 2007 | 7 | 1,173 | 1,133 | 1,255 | | 1,407 | |
| 2008 | 8 | 1,200 | 1,153 | 1,297 | | 1,477 | |
| 2009 | 9 | 1,227 | 1,174 | 1,339 | | 1,551 | |
| 2010 | 10 | 1,255 | 1,195 | 1,384 | | 1,629 | |
| 2011 | 11 | 1,284 | 1,217 | 1,429 | | 1,710 | |
| 2012 | 12 | 1,314 | 1,239 | 1,476 | | 1,796 | |
| 2013 | 13 | 1,344 | 1,261 | 1,525 | | 1,886 | |
| 2014 | 14 | 1,375 | 1,284 | 1,575 | | 1,980 | |
| 2015 | 15 | 1,406 | 1,307 | 1,627 | | 2,079 | |
| 2016 | 16 | 1,439 | 1,330 | 1,681 | | 2,183 | |
| 2017 | 17 | 1,472 | 1,354 | 1,737 | | 2,292 | |
| 2018 | 18 | 1,506 | 1,379 | 1,794 | | 2,407 | |
| 2019 | 19 | 1,540 | 1,403 | 1,853 | | 2,527 | |
| 2020 | 20 | 1,576 | 1,429 | 1,914 | | 2,653 | |
| 2021 | 21 | 1,612 | 1,454 | 1,977 | | 2,786 | |
| 2022 | 22 | 1,649 | 1,481 | 2,043 | | 2,925 | |
| 2023 | 23 | 1,687 | 1,507 | 2,110 | | 3,072 | |
| 2024 | 24 | 1,726 | 1,534 | 2,180 | | 3,225 | |
| 2025 | 25 | 1,766 | 1,562 | 2,252 | | 3,386 | |
| 2026 | 26 | 1,806 | 1,590 | 2,326 | | 3,556 | |
| 2027 | 27 | 1,848 | 1,619 | 2,403 | | 3,733 | |
| 2028 | 28 | 1,890 | 1,648 | 2,482 | | 3,920 | |
| 2029 | 29 | 1,934 | 1,678 | 2,564 | | 4,116 | |
| 2030 | 30 | 1,978 | 1,708 | 2,649 | | 4,322 | |
| 2031 | 31 | 2,024 | 1,739 | 2,736 | | 4,538 | |
| 2032 | 32 | 2,070 | 1,770 | 2,826 | | 4,765 | |
| 2033 | 33 | 2,118 | 1,802 | 2,920 | | 5,003 | |
| 2034 | 34 | 2,167 | 1,834 | 3,016 | | 5,253 | |
| 2035 | 35 | 2,216 | 1,867 | 3,115 | | 5,516 | |
| 2036 | 36 | 2,267 | 1,901 | 3,218 | | 5,792 | |
| 2037 | 37 | 2,320 | 1,935 | 3,324 | | 6,081 | |
| 2038 | 38 | 2,373 | 1,970 | 3,434 | | 6,385 | |
| 2039 | 39 | 2,427 | 2,005 | 3,547 | | 6,705 | |
| 2040 | 40 | 2,483 | 2,041 | 3,664 | | 7,040 | |

FORMULA: $F=P*(1+i)^n$

APPENDIX H. TURKCE ORJINAL DATA

| | |
|---------------|----|
| Toplam C-130 | 13 |
| Toplam C-160 | 12 |
| Toplam CN-235 | 12 |
| C-130E Sayisi | 7 |
| C-130B Sayisi | 6 |

222NCI FILO KOMUTANLIGI

| | Sayilari | Yillik Maas |
|------------------------|----------|-------------|
| Pilot | | |
| Tegmen | 1 | 7.500.000 |
| Usttegmen | 60 | 8.500.000 |
| Yuzbasi | 33 | 9.500.000 |
| Binbasi | 8 | 10.500.000 |
| Yarbay | | |
| Navigator | | |
| Usttegmen | 55 | 7.200.000 |
| Yuzbasi | 32 | 8.000.000 |
| Binbasi | 1 | 9.000.000 |
| Flight engineer | | |
| Cavus | | |
| Ustcavus | 48 | 7.000.000 |
| Bascavus | 54 | 8.000.000 |
| Loadmaster | | |
| Cavus | | |
| Ustcavus | 18 | 7.000.000 |
| Bascavus | 26 | 8.000.000 |

BAKIM KOMUTANLIGI

| Subaylar | Sayilari | Yillik Maas |
|-----------|----------|-------------|
| Tegmen | 1 | 5.500.000 |
| Usttegmen | 3 | 6.000.000 |
| Yuzbasi | 4 | 7.500.000 |
| Binbasi | 2 | 8.500.000 |

| | | |
|-------------|-----|-----------|
| Astsubaylar | 171 | 4.200.000 |
| Cavus | 71 | 4.800.000 |
| Ustcavus | 172 | 7.000.000 |
| Bascavus | | |
| Sivil | 7 | 3.600.000 |

Ucak Yer Sistemleri

| Subay | Sayilari | Yillik Maas |
|-------------|----------|-------------|
| Usttegmen | 2 | 7200000 |
| Astsubaylar | | |
| Cavus | | |
| Ustcavus | 2 | 4.800.000 |
| Bascavus | 3 | 7.500.000 |

Us Toplam Mevcut

Yer siniflari ve onceden belirtilmemis olanlar icin ortalama

| Subay | Sayilari | Yillik Maas |
|-------------|----------|-------------|
| Tegmen | 5 | 6.000.000 |
| Usttegmen | 30 | 7.000.000 |
| Yuzbasi | 60 | 8.000.000 |
| Binbasi | 10 | 8.500.000 |
| Yarbay | 8 | 10.000.000 |
| Albay | 2 | 12.000.000 |
| Tuggeneral | 1 | 15.000.000 |
| Astsubay | | |
| Cavus | 150 | 4.200.000 |
| Ustcavus | 62 | 4.800.000 |
| Bascavus | 140 | 7.000.000 |
| Sivil Memur | 80 | 4.000.000 |
| Asker | 800 | 300000 |

2.0 12th AIRLIFT BASE MATERIAL CONSUMPTION

2.1 Yaki yag enerji

| | | |
|-----------------------|----------|------|
| Ortalama yillik ucus | 500-1000 | |
| Saatte lb. Yakit sarf | | 4500 |
| Lb. Fiyati (Turkiye) | | 0,4 |

| | | |
|------------------|--|------|
| YAG | | |
| Saatte yag sarf. | | 1,2 |
| Yag galon fiyat | | 0,15 |

2.1.2 Elektrik

| | | |
|------------------|-----------|--------|
| Us yil.elek.tuk. | 370884000 | 247256 |
|------------------|-----------|--------|

2.2.1 Bakim Malzemeleri

C-130E SARF MALZEMELER

| S/N | STOCK NO | FIYAT | DONEMLIK | YILLIK |
|-----|------------------|-------------|----------|--------|
| 1 | 1560XXXXXXXX00LG | 4,69253E-05 | 269 | 1076 |
| 2 | 1560XXXXXXXX56LG | 0,000151767 | 38 | 152 |
| 3 | 1650XXXXXXXX665 | 2,666666667 | 56 | 224 |
| 4 | 1650XXXXXXXX060 | 2,78 | 21 | 84 |
| 5 | 1650XXXXXXXX430 | 2,63 | 21 | 84 |
| 6 | 1650XXXXXXXX0LE | 39,79 | 43 | 172 |
| 7 | 1670XXXXXXXX1LG | 0,000146667 | 14 | 56 |
| 8 | 2840XXXXXXXX709 | 30,05 | 27 | 108 |
| 9 | 2915XXXXXXXX90 | 36,88 | 13 | 52 |

| | | | | |
|----|-------------------|-------------|-----|------|
| 10 | 2915XXXXXXXXX8RW | 16,05 | 51 | 204 |
| 11 | 2940XXXXXXXXX58 | 3,8 | 30 | 120 |
| 12 | 2945XXXXXXXXX384 | 21,82 | 12 | 48 |
| 13 | 4020XXXXXXXXX334 | 10,07 | 2 | 8 |
| 14 | 4330XXXXXXXXX593 | 2,51 | 4 | 16 |
| 15 | 4330XXXXXXXXX274 | 2,42 | 16 | 64 |
| 16 | 4330XXXXXXXXX013 | 37,96 | 22 | 88 |
| 17 | 4730XXXXXXXXX7SX | 166,1 | 11 | 44 |
| 18 | 4935XXXXXXXXX425 | 10,66666667 | 2 | 8 |
| 19 | 5305XXXXXXXXX902 | 0,42 | 356 | 1424 |
| 20 | 5310XXXXXXXXX406 | 2,8 | 20 | 80 |
| 21 | 5315XXXXXXXXX873 | 9,25 | 84 | 336 |
| 22 | 5315XXXXXXXXX359 | 2,02 | 500 | 2000 |
| 23 | 5315XXXXXXXXX274 | 0,14 | 191 | 764 |
| 24 | 5315XXXXXXXXX566 | 0,68 | 55 | 220 |
| 25 | 5330XXXXXXXXX759 | 0,00007616 | 139 | 556 |
| 26 | 5330XXXXXXXXX790 | 0,666666667 | 50 | 200 |
| 27 | 5330XXXXXXXXX032 | 322 | 12 | 48 |
| 28 | 5330XXXXXXXXX462 | 1,063333333 | 19 | 76 |
| 29 | 5330XXXXXXXXX525 | 0,08 | 4 | 16 |
| 30 | 5330XXXXXXXXX527 | 500 | 32 | 128 |
| 31 | 5330XXXXXXXXX006 | 35,29 | 5 | 20 |
| 32 | 5330XXXXXXXXX345 | 47,5 | 28 | 112 |
| 33 | 5330XXXXXXXXX310 | 0,00038 | 5 | 20 |
| 34 | 5330XXXXXXXXX898 | 200 | 5 | 20 |
| 35 | 5331XXXXXXXXX331 | 61 | 14 | 56 |
| 36 | 5331XXXXXXXXX174 | 15 | 5 | 20 |
| 37 | 5331XXXXXXXXX278 | 50 | 16 | 64 |
| 38 | 5331XXXXXXXXX607 | 0,0005 | 16 | 64 |
| 39 | 5331XXXXXXXXX633 | 50 | 5 | 20 |
| 40 | 5331XXXXXXXXX262 | 10,1 | 18 | 72 |
| 41 | 5340XXXXXXXXX90SX | 0,1 | 488 | 1952 |
| 42 | 5340XXXXXXXXX31SX | 0,11 | 744 | 2976 |
| 43 | 5342XXXXXXXXX68SX | 4,23 | 9 | 36 |
| 44 | 5355XXXXXXXXX40SX | 7,67 | 13 | 52 |
| 45 | 5355XXXXXXXXX138 | 20,7 | 36 | 144 |
| 46 | 5930XXXXXXXXX67SX | 559,44 | 14 | 56 |
| 47 | 5930XXXXXXXXX290 | 222,27 | 1 | 4 |
| 48 | 5930XXXXXXXXX3SX | 631,29 | 1 | 4 |
| 49 | 5935XXXXXXXXX174 | 7,37 | 10 | 40 |
| 50 | 5940XXXXXXXXX370 | 0,24 | 13 | 52 |
| 51 | 5975XXXXXXXXX284 | 0,666666667 | 188 | 752 |
| 52 | 6220XXXXXXXXX797 | 9,5 | 4 | 16 |
| 53 | 6220XXXXXXXXX244 | 11,35 | 13 | 52 |
| 54 | 6240XXXXXXXXX784 | 0,32 | 77 | 308 |
| 55 | 6240XXXXXXXXX824 | 1,13 | 146 | 584 |
| 56 | 6240XXXXXXXXX848 | 0,23 | 128 | 512 |
| 57 | 6240XXXXXXXXX518 | 8,37 | 5 | 20 |
| 58 | 6240XXXXXXXXX094 | 22,27 | 1 | 4 |
| 59 | 6240XXXXXXXXX48SX | 4,66 | 39 | 156 |
| 60 | 6240XXXXXXXXX757 | 1,342666667 | 12 | 48 |
| 61 | 6340XXXXXXXXX289 | 188,84 | 1 | 4 |
| 62 | 6685XXXXXXXXX564 | 328,61 | 1 | 4 |
| 63 | 6685XXXXXXXXX46NT | 339,07 | 5 | 20 |
| 64 | 6850XXXXXXXXX188 | 17,83 | 16 | 64 |
| 65 | 9150XXXXXXXXX860 | 0,000153333 | 9 | 36 |
| 66 | 9505XXXXXXXXX175 | 5,12 | 10 | 40 |

| C-130 B SARF MALZEMELERİ | | | | | |
|--------------------------|------------------|-------------|----------|--------|------|
| S/N | STOCK NO | FIYAT | DONEMLİK | YILLIK | |
| 1 | 1560XXXXXXXX00LG | 4,69253E-05 | | 371 | 1484 |
| 2 | 1560XXXXXXXX56LG | 0,000151767 | | 57 | 228 |
| 3 | 1650XXXXXX665 | 2,666666667 | | 65 | 260 |
| 4 | 1650XXXXXX060 | 2,78 | | 32 | 128 |
| 5 | 1650XXXXXX430 | 2,63 | | 35 | 140 |
| 6 | 1650XXXXXXX0LE | 39,79 | | 87 | 348 |
| 7 | 1670XXXXXXXX1LG | 0,000146667 | | 9 | 36 |
| 8 | 2840XXXXXX709 | 30,05 | | 34 | 136 |
| 9 | 2915XXXXXX90 | 36,88 | | 19 | 76 |
| 10 | 2915XXXXXXX8RW | 16,05 | | 58 | 232 |
| 11 | 2940XXXXXX58 | 3,8 | | 41 | 164 |
| 12 | 2945XXXXXX384 | 21,82 | | 22 | 88 |
| 13 | 4020XXXXXX334 | 10,07 | | 9 | 36 |
| 14 | 4330XXXXXX593 | 2,51 | | 3 | 12 |
| 15 | 4330XXXXXX274 | 2,42 | | 14 | 56 |
| 16 | 4330XXXXXX013 | 37,96 | | 28 | 112 |
| 17 | 4730XXXXXXXX7SX | 166,1 | | 14 | 56 |
| 18 | 4935XXXXXX425 | 10,66666667 | | 8 | 32 |
| 19 | 5305XXXXXX902 | 0,42 | | 222 | 888 |
| 20 | 5310XXXXXX406 | 2,8 | | 16 | 64 |
| 21 | 5315XXXXXX873 | 9,25 | | 92 | 368 |
| 22 | 5315XXXXXX359 | 2,02 | | 750 | 3000 |
| 23 | 5315XXXXXX274 | 0,14 | | 175 | 700 |
| 24 | 5315XXXXXX566 | 0,68 | | 92 | 368 |
| 25 | 5330XXXXXX759 | 0,00007616 | | 196 | 784 |
| 26 | 5330XXXXXX790 | 0,666666667 | | 42 | 168 |
| 27 | 5330XXXXXX032 | 322 | | 14 | 56 |
| 28 | 5330XXXXXX462 | 1,063333333 | | 28 | 112 |
| 29 | 5330XXXXXX525 | 0,08 | | 9 | 36 |
| 30 | 5330XXXXXX527 | 500 | | 45 | 180 |
| 31 | 5330XXXXXX006 | 35,29 | | 8 | 32 |
| 32 | 5330XXXXXX345 | 47,5 | | 32 | 128 |
| 33 | 5330XXXXXX310 | 0,00038 | | 19 | 76 |
| 34 | 5330XXXXXX898 | 200 | | 4 | 16 |
| 35 | 5331XXXXXX331 | 61 | | 17 | 68 |
| 36 | 5331XXXXXX174 | 15 | | 7 | 28 |
| 37 | 5331XXXXXX278 | 50 | | 20 | 80 |
| 38 | 5331XXXXXX607 | 0,0005 | | 5 | 20 |
| 39 | 5331XXXXXX633 | 50 | | 7 | 28 |
| 40 | 5331XXXXXX262 | 10,1 | | 14 | 56 |
| 41 | 5340XXXXXX90SX | 0,1 | | 322 | 1288 |
| 42 | 5340XXXXXX31SX | 0,11 | | 525 | 2100 |
| 43 | 5342XXXXXX68SX | 4,23 | | 10 | 40 |
| 44 | 5355XXXXXX40SX | 7,67 | | 16 | 64 |
| 45 | 5355XXXXXX138 | 20,7 | | 31 | 124 |
| 46 | 5930XXXXXX67SX | 559,44 | | 14 | 56 |
| 47 | 5930XXXXXX290 | 222,27 | | 0 | 0 |
| 48 | 5930XXXXXX3SX | 631,29 | | 2 | 8 |
| 49 | 5935XXXXXX174 | 7,37 | | 17 | 68 |
| 50 | 5940XXXXXX370 | 0,24 | | 25 | 100 |
| 51 | 5975XXXXXX284 | 0,666666667 | | 250 | 1000 |
| 52 | 6220XXXXXX797 | 9,5 | | 3 | 12 |
| 53 | 6220XXXXXX244 | 11,35 | | 16 | 64 |
| 54 | 6240XXXXXX784 | 0,32 | | 58 | 232 |
| 55 | 6240XXXXXX824 | 1,13 | | 122 | 488 |
| 56 | 6240XXXXXX848 | 0,23 | | 138 | 552 |

| | | | | |
|----|----------------|-------------|----|-----|
| 57 | 6240XXXXXX518 | 8,37 | 7 | 28 |
| 58 | 6240XXXXXX094 | 22,27 | 3 | 12 |
| 59 | 6240XXXXXX48SX | 4,66 | 27 | 108 |
| 60 | 6240XXXXXX757 | 1,342666667 | 19 | 76 |
| 61 | 6340XXXXXX289 | 188,84 | 1 | 4 |
| 62 | 6685XXXXXX564 | 328,61 | 1 | 4 |
| 63 | 6685XXXXXX46NT | 339,07 | 6 | 24 |
| 64 | 6850XXXXXX188 | 17,83 | 18 | 72 |
| 65 | 9150XXXXXX860 | 0,000153333 | 17 | 68 |
| 66 | 9505XXXXXX175 | 5,12 | 9 | 36 |

| | | | | |
|------------------|---------|-------------|----------|-------------|
| Tamirlik Malzeme | iyimser | \$10.075,00 | kotumser | \$12.025,00 |
|------------------|---------|-------------|----------|-------------|

2.2.2 Gorev destek malzemeleri \$33.333,33

2.2.3 Diger birlik sarf malzemeleri \$333.333,33

4.0 Depo seviyesi bakim

| | | | | |
|--------------|---------|--------------|----------|----------------|
| 4.1 Overhaul | iyimser | \$500.000,00 | kotumser | \$1.000.000,00 |
|--------------|---------|--------------|----------|----------------|

4.2 Diger

| Asil personel | Sayilari | Yillik maas |
|---------------|----------|-------------|
| Subay | | |
| Binbasi | 1 | 8500000 |
| Yuzbasi | 1 | 8000000 |
| Usttegmen | 1 | 7000000 |
| Astsubaylar | | |
| Cavus | 4 | 4200000 |
| Ustcavus | 3 | 4800000 |
| Bascavus | 3 | 7000000 |
| Muhendis | 5 | 12000000 |
| Teknisyen | 15 | 9600000 |
| Sivil Isci | 48 | 7800000 |

Diger personel

| | | |
|------------|----|----------|
| Subay | | |
| Yarbay | 1 | 10000000 |
| Binbasi | 2 | 8500000 |
| Yuzbasi | 2 | 8000000 |
| Usttegmen | 2 | 7000000 |
| Astsubay | | |
| Cavus | 8 | 4200000 |
| Ustcavus | 7 | 4800000 |
| Bascavus | 6 | 7000000 |
| Muhendis | 10 | 12000000 |
| Teknisyen | 30 | 9600000 |
| Sivil Isci | 76 | 7800000 |

5.0 Kontraktor desteđi

YOK

6.1 tehzizat tipi malzeme desteđi

C-130 UCAK TEHZIZATLARI

| S/N | STOCK NO | Fiyat | Sayilari | |
|--------------------------|------------------|--------------|----------|-----------|
| | 1 6115XXXXXX486 | | 241643 | 10 |
| | 2 1740XXXXXX287 | | 32102 | 5 |
| | 3 1730XXXXXX439 | | 3630 | 20 |
| | 4 2320XXXXXX709 | | 269000 | 4 |
| | 5 3655XXXXXX062 | | 50719 | 4 |
| | 6 3655XXXXXX943 | | 17506 | 4 |
| | 7 1650XXXXXX323 | | 8500 | 5 |
| | 8 4910XXXXXX124 | 16727,46667 | | 3 |
| | 9 1730XXXXXX969 | | 40000 | 3 |
| | 10 6230XXXXXX804 | | 6500 | 5 |
| | 11 4520XXXXXX789 | | 1500,24 | 20 |
| | 12 1740XXXXXX561 | | 50000 | 4 |
| | 13 4310XXXXXX653 | | 3502 | 20 |
| | | lyimser | | Kotumser |
| 6.2 Modifikasyon kiti | | \$390.000,00 | | \$520.000 |
| 7.1.2 Medical Support | | 250000 | | |
| 7.2 Bina bakim giderleri | | 725000 | | |

APPENDIX I. ORIGINAL DATA FOR C-130E&B IN ENGLISH

| | | |
|---|---------|-------------|
| Total C-130 Aircraft | 13 | |
| Total C-160 Aircraft | 12 | |
| Total CN-235 Aircraft | 12 | |
| Number of C-130E | 7 | |
| Number of C-130B | 6 | |
| 1.0 MISSION PERSONNEL | | |
| 1.1 OPERATION | | |
| | No Per. | Ann. Salary |
| Pilot | | |
| 2nd Lieutenant | 1 | 7.500.000 |
| 1st Lieutenant | 60 | 8.500.000 |
| Captain | 33 | 9.500.000 |
| Major | 8 | 10.500.000 |
| Navigator | | |
| 1st Lieutenant | 55 | 7.200.000 |
| Captain | 32 | 8.000.000 |
| Major | 1 | 9.000.000 |
| Flight engineer | | |
| 3rd Sergeant | | |
| 2nd Sergeant | 48 | 7.000.000 |
| 1st Sergeant | 54 | 8.000.000 |
| Loadmaster | | |
| 3rd Sergeant | | |
| 2nd Sergeant | 18 | 7.000.000 |
| 1st Sergeant | 26 | 8.000.000 |
| Total | 224 | |
| 1.2 MAINTENANCE | | |
| Officers | | |
| 2nd Lieutenant | 1 | 5.500.000 |
| 1st Lieutenant | 3 | 6.000.000 |
| Captain | 4 | 7.500.000 |
| Major | 2 | 8.500.000 |
| NCOs | | |
| 3rd Sergeant | 171 | 4.200.000 |
| 2nd Sergeant | 71 | 4.800.000 |
| 1st Sergeant | 172 | 7.000.000 |
| Civilian | 7 | 3.600.000 |
| Aircraft and Ground Systems Office | | |
| Officer | | |
| 1st Lieutenant | 2 | 7.200.000 |
| NCOs | | |
| 3rd Sergeant | 2 | 4.800.000 |
| 1st Sergeant | 3 | 7.500.000 |

1.3 12th AIRLIFT BASE

| | | |
|-----------------|----|------------|
| Officers | | |
| 2nd Lieutenant | 5 | 6.000.000 |
| 1st Lieutenant | 30 | 7.000.000 |
| Captain | 60 | 8.000.000 |
| Major | 10 | 8.500.000 |
| Lt Col. | 8 | 10.000.000 |
| Col | 2 | 12.000.000 |
| General | 1 | 15.000.000 |

NCOs

| | | |
|--------------|-----|-----------|
| 3rd Sergeant | 150 | 4.200.000 |
| 2nd Sergeant | 62 | 4.800.000 |
| 1st Sergeant | 140 | 7.000.000 |

| | | |
|-----------------|-----|-----------|
| Civilian | | |
| Enlisted | 80 | 4.000.000 |
| | 800 | 300.000 |

2.0 12th AIRLIFT BASE MATERIAL CONSUMPTION

2.1 Fuel Lubricants and Energy

2.1.1 Fuel and Lubricants

| | | | |
|------------------------|----------|------|-------------|
| | | | Cost |
| Average flight hour | 500-1000 | | |
| Libre per hour | | 4500 | |
| Cost of fuel per libre | | 0,4 | |

Oil

| | |
|-----------------------|------|
| Galon per hour | 1,2 |
| Cost of oil per galon | 0,15 |

2.1.2 Electricity

| | | |
|-------------------------|-----------|-----------|
| Ann. base electric bill | 370884000 | \$247.256 |
|-------------------------|-----------|-----------|

2.2 Consumable Material

2.2.1 Maintenance Material

| S/N | C-130E CONSUMABLE MATERIALS | | QUARTERLY USAGE | ANNUAL USAGE |
|-----|-----------------------------|-------------|-----------------|--------------|
| | STOCK NO | PRICE | | |
| 1 | 1560XXXXXXXX00LG | 0,00005 | 269 | 1076 |
| 2 | 1560XXXXXXXX56LG | 0,000151767 | 38 | 152 |
| 3 | 1650XXXXXXXX665 | 3 | 56 | 224 |
| 4 | 1650XXXXXXXX060 | 2,78 | 21 | 84 |
| 5 | 1650XXXXXXXX430 | 2,63 | 21 | 84 |
| 6 | 1650XXXXXXXXX0LE | 39,79 | 43 | 172 |
| 7 | 1670XXXXXXXXX1LG | 0,000146667 | 14 | 56 |
| 8 | 2840XXXXXXXX709 | 30,05 | 27 | 108 |
| 9 | 2915XXXXXXXXX90 | 36,88 | 13 | 52 |
| 10 | 2915XXXXXXXXX8RW | 16,05 | 51 | 204 |
| 11 | 2940XXXXXXXXX58 | 3,8 | 30 | 120 |

| | | | | |
|----|-----------------|-------------|-----|------|
| 12 | 2945XXXXXX384 | 21,82 | 12 | 48 |
| 13 | 4020XXXXXX334 | 10,07 | 2 | 8 |
| 14 | 4330XXXXXX593 | 2,51 | 4 | 16 |
| 15 | 4330XXXXXX274 | 2,42 | 16 | 64 |
| 16 | 4330XXXXXX013 | 37,96 | 22 | 88 |
| 17 | 4730XXXXXXXX7SX | 166,1 | 11 | 44 |
| 18 | 4935XXXXXX425 | 11 | 2 | 8 |
| 19 | 5305XXXXXX902 | 0,42 | 356 | 1424 |
| 20 | 5310XXXXXX406 | 2,8 | 20 | 80 |
| 21 | 5315XXXXXX873 | 9,25 | 84 | 336 |
| 22 | 5315XXXXXX359 | 2,02 | 500 | 2000 |
| 23 | 5315XXXXXX274 | 0,14 | 191 | 764 |
| 24 | 5315XXXXXX566 | 0,68 | 55 | 220 |
| 25 | 5330XXXXXX759 | 0,00007616 | 139 | 556 |
| 26 | 5330XXXXXX790 | 0,667 | 50 | 200 |
| 27 | 5330XXXXXX032 | 322 | 12 | 48 |
| 28 | 5330XXXXXX462 | 1,063333333 | 19 | 76 |
| 29 | 5330XXXXXX525 | 0,08 | 4 | 16 |
| 30 | 5330XXXXXX527 | 500 | 32 | 128 |
| 31 | 5330XXXXXX006 | 35,29 | 5 | 20 |
| 32 | 5330XXXXXX345 | 47,5 | 28 | 112 |
| 33 | 5330XXXXXX310 | 0,00038 | 5 | 20 |
| 34 | 5330XXXXXX898 | 200 | 5 | 20 |
| 35 | 5331XXXXXX331 | 61 | 14 | 56 |
| 36 | 5331XXXXXX174 | 15 | 5 | 20 |
| 37 | 5331XXXXXX278 | 50 | 16 | 64 |
| 38 | 5331XXXXXX607 | 0,0005 | 16 | 64 |
| 39 | 5331XXXXXX633 | 50 | 5 | 20 |
| 40 | 5331XXXXXX262 | 10,1 | 18 | 72 |
| 41 | 5340XXXXXX90SX | 0,1 | 488 | 1952 |
| 42 | 5340XXXXXX31SX | 0,11 | 744 | 2976 |
| 43 | 5342XXXXXX68SX | 4,23 | 9 | 36 |
| 44 | 5355XXXXXX40SX | 7,67 | 13 | 52 |
| 45 | 5355XXXXXX138 | 20,7 | 36 | 144 |
| 46 | 5930XXXXXX67SX | 559,44 | 14 | 56 |
| 47 | 5930XXXXXX290 | 222,27 | 1 | 4 |
| 48 | 5930XXXXXX3SX | 631,29 | 1 | 4 |
| 49 | 5935XXXXXX174 | 7,37 | 10 | 40 |
| 50 | 5940XXXXXX370 | 0,24 | 13 | 52 |
| 51 | 5975XXXXXX284 | 0,666666667 | 188 | 752 |
| 52 | 6220XXXXXX797 | 9,5 | 4 | 16 |
| 53 | 6220XXXXXX244 | 11,35 | 13 | 52 |
| 54 | 6240XXXXXX784 | 0,32 | 77 | 308 |
| 55 | 6240XXXXXX824 | 1,13 | 146 | 584 |
| 56 | 6240XXXXXX848 | 0,23 | 128 | 512 |
| 57 | 6240XXXXXX518 | 8,37 | 5 | 20 |
| 58 | 6240XXXXXX094 | 22,27 | 1 | 4 |
| 59 | 6240XXXXXX48SX | 4,66 | 39 | 156 |
| 60 | 6240XXXXXX757 | 1,342666667 | 12 | 48 |
| 61 | 6340XXXXXX289 | 188,84 | 1 | 4 |
| 62 | 6685XXXXXX564 | 328,61 | 1 | 4 |
| 63 | 6685XXXXXX46NT | 339,07 | 5 | 20 |
| 64 | 6850XXXXXX188 | 17,83 | 16 | 64 |
| 65 | 9150XXXXXX860 | 0,000153333 | 9 | 36 |
| 66 | 9505XXXXXX175 | 5,12 | 10 | 40 |

| C-130 B CONSUMABLE MATERIALS | | | | | |
|------------------------------|-------------------|-------------|-----------------|--------------|--|
| S/N | STOCK NO | PRICE | QUARTERLY USAGE | ANNUAL USAGE | |
| 1 | 1560XXXXXXXX00LG | 0,00005 | 371 | 1484 | |
| 2 | 1560XXXXXXXX56LG | 0,000151767 | 57 | 228 | |
| 3 | 1650XXXXXXXX665 | 3 | 65 | 260 | |
| 4 | 1650XXXXXXXX060 | 2,78 | 32 | 128 | |
| 5 | 1650XXXXXXXX430 | 2,63 | 35 | 140 | |
| 6 | 1650XXXXXXXXX0LE | 39,79 | 87 | 348 | |
| 7 | 1670XXXXXXXXX1LG | 0,000146667 | 9 | 36 | |
| 8 | 2840XXXXXXXX709 | 30,05 | 34 | 136 | |
| 9 | 2915XXXXXXXXX90 | 36,88 | 19 | 76 | |
| 10 | 2915XXXXXXXXX8RW | 16,05 | 58 | 232 | |
| 11 | 2940XXXXXXXXX58 | 3,8 | 41 | 164 | |
| 12 | 2945XXXXXXXXX384 | 21,82 | 22 | 88 | |
| 13 | 4020XXXXXXXXX334 | 10,07 | 9 | 36 | |
| 14 | 4330XXXXXXXXX593 | 2,51 | 3 | 12 | |
| 15 | 4330XXXXXXXXX274 | 2,42 | 14 | 56 | |
| 16 | 4330XXXXXXXXX013 | 37,96 | 28 | 112 | |
| 17 | 4730XXXXXXXXX7SX | 166,1 | 14 | 56 | |
| 18 | 4935XXXXXXXXX425 | 11 | 8 | 32 | |
| 19 | 5305XXXXXXXXX902 | 0,42 | 222 | 888 | |
| 20 | 5310XXXXXXXXX406 | 2,8 | 16 | 64 | |
| 21 | 5315XXXXXXXXX873 | 9,25 | 92 | 368 | |
| 22 | 5315XXXXXXXXX359 | 2,02 | 750 | 3000 | |
| 23 | 5315XXXXXXXXX274 | 0,14 | 175 | 700 | |
| 24 | 5315XXXXXXXXX566 | 0,68 | 92 | 368 | |
| 25 | 5330XXXXXXXXX759 | 0,00007616 | 196 | 784 | |
| 26 | 5330XXXXXXXXX790 | 0,667 | 42 | 168 | |
| 27 | 5330XXXXXXXXX032 | 322 | 14 | 56 | |
| 28 | 5330XXXXXXXXX462 | 1,063333333 | 28 | 112 | |
| 29 | 5330XXXXXXXXX525 | 0,08 | 9 | 36 | |
| 30 | 5330XXXXXXXXX527 | 500 | 45 | 180 | |
| 31 | 5330XXXXXXXXX006 | 35,29 | 8 | 32 | |
| 32 | 5330XXXXXXXXX345 | 47,5 | 32 | 128 | |
| 33 | 5330XXXXXXXXX310 | 0,00038 | 19 | 76 | |
| 34 | 5330XXXXXXXXX898 | 200 | 4 | 16 | |
| 35 | 5331XXXXXXXXX331 | 61 | 17 | 68 | |
| 36 | 5331XXXXXXXXX174 | 15 | 7 | 28 | |
| 37 | 5331XXXXXXXXX278 | 50 | 20 | 80 | |
| 38 | 5331XXXXXXXXX607 | 0,0005 | 5 | 20 | |
| 39 | 5331XXXXXXXXX633 | 50 | 7 | 28 | |
| 40 | 5331XXXXXXXXX262 | 10,1 | 14 | 56 | |
| 41 | 5340XXXXXXXXX90SX | 0,1 | 322 | 1288 | |
| 42 | 5340XXXXXXXXX31SX | 0,11 | 525 | 2100 | |
| 43 | 5342XXXXXXXXX68SX | 4,23 | 10 | 40 | |
| 44 | 5355XXXXXXXXX40SX | 7,67 | 16 | 64 | |
| 45 | 5355XXXXXXXXX138 | 20,7 | 31 | 124 | |
| 46 | 5930XXXXXXXXX67SX | 559,44 | 14 | 56 | |
| 47 | 5930XXXXXXXXX290 | 222,27 | 0 | 0 | |
| 48 | 5930XXXXXXXXX3SX | 631,29 | 2 | 8 | |
| 49 | 5935XXXXXXXXX174 | 7,37 | 17 | 68 | |
| 50 | 5940XXXXXXXXX370 | 0,24 | 25 | 100 | |
| 51 | 5975XXXXXXXXX284 | 0,666666667 | 250 | 1000 | |
| 52 | 6220XXXXXXXXX797 | 9,5 | 3 | 12 | |
| 53 | 6220XXXXXXXXX244 | 11,35 | 16 | 64 | |

| | | | | |
|----|----------------|-------------|-----|-----|
| 54 | 6240XXXXXX784 | 0,32 | 58 | 232 |
| 55 | 6240XXXXXX824 | 1,13 | 122 | 488 |
| 56 | 6240XXXXXX848 | 0,23 | 138 | 552 |
| 57 | 6240XXXXXX518 | 8,37 | 7 | 28 |
| 58 | 6240XXXXXX094 | 22,27 | 3 | 12 |
| 59 | 6240XXXXXX48SX | 4,66 | 27 | 108 |
| 60 | 6240XXXXXX757 | 1,342666667 | 19 | 76 |
| 61 | 6340XXXXXX289 | 188,84 | 1 | 4 |
| 62 | 6685XXXXXX564 | 328,61 | 1 | 4 |
| 63 | 6685XXXXXX46NT | 339,07 | 6 | 24 |
| 64 | 6850XXXXXX188 | 17,83 | 18 | 72 |
| 65 | 9150XXXXXX860 | 0,000153333 | 17 | 68 |
| 66 | 9505XXXXXX175 | 5,12 | 9 | 36 |

Maintenance Material

2.2.2 Mission Support Supplies

2.2.3 Other Unit Level Consumption

3.0 Intermediate Maintenance

4.0 Depot Level Maintenance

| | | Optimistic | Pessimistic |
|--------------------|---------|---------------|----------------|
| 4.1 Overhaul | | \$500.000,00 | \$1.000.000,00 |
| 4.2 Other | | | |
| Direct Personnel | No.Per. | | |
| Officer | | | |
| Major | 1 | 8.500.000,00 | |
| Captain | 1 | 8.000.000,00 | |
| 1st Lt. | 1 | 7.000.000,00 | |
| NCO | | | |
| 3rd Sergeant | 4 | 4.200.000 | |
| 2nd Sergeant | 3 | 4.800.000 | |
| 1st Sergeant | 3 | 7.000.000 | |
| Engineer | 5 | 12.000.000 | |
| Technician | 15 | 9.600.000 | |
| Civilian Labor | 48 | 7.800.000 | |
| Indirect Personnel | | | |
| Officer | | | |
| Lt.Colonel | 1 | 10.000.000,00 | |
| Major | 2 | 8.500.000,00 | |
| Captain | 2 | 8.000.000,00 | |
| 1st Lt. | 2 | 7.000.000,00 | |
| NCO | | | |
| 3rd Sergeant | 8 | 4.200.000 | |
| 2nd Sergeant | 7 | 4.800.000 | |
| 1st Sergeant | 6 | 7.000.000 | |
| Engineer | 10 | 12.000.000 | |
| Technician | 30 | 9.600.000 | |
| Civilian Labor | 76 | 7.800.000 | |

5.0 Contractor Support

NO!

6.0 Sustaining Support

6.1 Support Equipment Replacement

C-130 AIRCRAFT EQUIPMENTS

| SN | STOCK NO | PRICE | No. Equip. |
|----|---------------|-----------|------------|
| 1 | 6115XXXXXX486 | \$241.643 | 10 |
| 2 | 1740XXXXXX287 | \$32.102 | 5 |
| 3 | 1730XXXXXX439 | \$3.630 | 20 |
| | 2320XXXXXX709 | \$269.000 | |
| 4 | | | 4 |
| | 3655XXXXXX062 | \$50.719 | |
| 5 | | | 4 |
| | 3655XXXXXX943 | \$17.506 | |
| 6 | | | 4 |
| | 1650XXXXXX323 | \$8.500 | |
| 7 | | | 5 |
| | 4910XXXXXX124 | \$16.727 | |
| 8 | | | 3 |
| | 1730XXXXXX969 | \$40.000 | |
| 9 | | | 3 |
| | 6230XXXXXX804 | \$6.500 | |
| 10 | | | 5 |
| | 4520XXXXXX789 | \$1.500 | |
| 11 | | | 20 |
| | 1740XXXXXX561 | \$50.000 | |
| 12 | | | 4 |
| | 4310XXXXXX653 | \$3.502 | |
| 13 | | | 20 |

| | Optimistic | Pessimistic |
|--------------------------|--------------|--------------|
| 6.2 Modification Kit | \$390.000,00 | \$520.000,00 |
| 7.1.2 Medical Support | \$250.000,00 | |
| 7.2 Installation Support | \$725.000,00 | |

APPENDIX J. ORIGINAL DATA FOR 10 C-130J

| | OPERATIONS | OTHER SUPP/INDIRECT SUPP | FUEL | PARTS |
|-------|--------------------|-----------------------------|--------------------|--------------------|
| FY 99 | \$1,566.434 | \$5,733.333 | \$2,533.333 | \$3,069.231 |
| FY 00 | \$3,289.510 | \$11,466.667 | \$5,066.667 | \$6,322.615 |
| FY 01 | \$4,934.266 | \$17,200.000 | \$7,600.000 | \$9,483.923 |
| FY 02 | \$6,579.021 | \$22,933.333 | \$10,133.333 | \$12,645.231 |
| FY 03 | \$8,223.776 | \$28,666.667 | \$12,666.667 | \$15,806.538 |
| FY 04 | \$9,868.531 | \$34,400.000 | \$15,200.000 | \$18,967.846 |
| FY 05 | \$11,513.287 | \$40,133.333 | \$17,733.333 | \$22,129.154 |
| FY 06 | \$13,158.042 | \$45,866.667 | \$20,266.667 | \$25,290.462 |
| FY 07 | \$14,802.797 | \$51,600.000 | \$22,800.000 | \$28,451.769 |
| FY 08 | \$16,447.552 | \$57,333.333 | \$25,333.333 | \$31,613.077 |
| FY 09 | \$18,092.308 | \$63,066.667 | \$27,866.667 | \$34,774.385 |
| FY 10 | \$19,737.063 | \$68,800.000 | \$30,400.000 | \$37,935.692 |
| FY 11 | \$21,381.818 | \$74,533.333 | \$32,933.333 | \$41,097.000 |
| FY 12 | \$23,026.573 | \$80,266.667 | \$35,466.667 | \$47,419.615 |
| FY 13 | \$24,671.329 | \$86,000.000 | \$38,000.000 | \$47,419.615 |
| FY 14 | \$25,904.895 | \$86,860.000 | \$38,000.000 | \$48,842.204 |
| FY 15 | \$27,200.140 | \$87,728.600 | \$38,000.000 | \$50,307.470 |
| FY 16 | \$28,560.147 | \$88,605.886 | \$38,000.000 | \$51,816.694 |
| FY 17 | \$29,988.154 | \$89,491.945 | \$38,000.000 | \$53,371.195 |
| FY 18 | \$31,487.562 | \$90,386.864 | \$38,000.000 | \$54,972.331 |
| FY 19 | \$33,061.940 | \$91,290.733 | \$38,000.000 | \$56,621.501 |
| FY 20 | \$34,715.037 | \$92,203.640 | \$38,000.000 | \$58,320.146 |
| FY 21 | \$36,450.789 | \$93,125.677 | \$38,000.000 | \$60,069.750 |
| FY 22 | \$38,273.328 | \$94,056.933 | \$38,000.000 | \$61,871.843 |
| FY 23 | \$40,186.995 | \$94,997.503 | \$38,000.000 | \$63,727.998 |
| FY 24 | \$42,196.344 | \$95,947.478 | \$38,000.000 | \$65,639.838 |
| FY 25 | \$42,618.308 | \$96,906.953 | \$38,000.000 | \$67,609.033 |
| FY 26 | \$43,044.491 | \$97,876.022 | \$38,000.000 | \$69,637.304 |
| FY 27 | \$43,474.936 | \$98,854.782 | \$38,000.000 | \$71,726.423 |
| FY 28 | \$43,909.685 | \$99,843.330 | \$38,000.000 | \$73,878.216 |
| FY 29 | \$44,348.782 | \$100,841.763 | \$38,000.000 | \$76,094.562 |
| FY 30 | \$44,792.270 | \$101,850.181 | \$38,000.000 | \$78,377.399 |
| FY 31 | \$45,240.193 | \$102,868.683 | \$38,000.000 | \$80,728.721 |
| FY 32 | \$45,692.595 | \$103,897.370 | \$38,000.000 | \$83,150.583 |
| FY 33 | \$46,149.520 | \$104,936.343 | \$38,000.000 | \$85,645.100 |
| FY 34 | \$46,611.016 | \$105,985.707 | \$38,000.000 | \$88,214.453 |
| FY 35 | \$47,077.126 | \$107,045.564 | \$38,000.000 | \$90,860.887 |
| FY 36 | \$47,547.897 | \$108,116.020 | \$38,000.000 | \$93,586.713 |
| FY 37 | \$48,023.376 | \$109,197.180 | \$38,000.000 | \$96,394.315 |
| FY 38 | \$48,503.610 | \$110,289.152 | \$38,000.000 | \$99,286.144 |
| FY 39 | \$48,988.646 | \$111,392.043 | \$38,000.000 | \$102,264.728 |
| FY 40 | \$49,478.532 | \$112,505.964 | \$38,000.000 | \$105,332.670 |
| FY 41 | \$49,973.318 | \$113,631.023 | \$38,000.000 | \$108,492.650 |
| FY 42 | \$50,473.051 | \$114,767.333 | \$38,000.000 | \$111,747.430 |
| FY 43 | \$50,977.781 | \$115,915.007 | \$38,000.000 | \$115,099.853 |
| FY 44 | \$51,487.559 | \$117,074.157 | \$38,000.000 | \$118,552.848 |
| FY 45 | \$52,002.435 | \$118,244.898 | \$38,000.000 | \$122,109.434 |
| FY 46 | \$52,522.459 | \$119,427.347 | \$38,000.000 | \$125,772.717 |
| FY 47 | \$53,047.684 | \$120,621.621 | \$38,000.000 | \$129,545.898 |
| FY 48 | \$53,578.161 | \$121,827.837 | \$38,000.000 | \$133,432.275 |
| FY 49 | \$54,113.942 | \$123,046.115 | \$38,000.000 | \$137,435.244 |
| FY 50 | \$54,655.082 | \$124,276.577 | \$38,000.000 | \$141,558.301 |
| | \$1,823,650,092,63 | \$4,553,934,230,82 | \$1,710,000,000,00 | \$3,614,521,023,18 |

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| 14. ABSTRACT <p>This study addresses the operation and support cost differences between the TUAFF C-130E & C-130B, and the USAF C-130J aircraft. The TUAFF C-130s have been being used for more than 30 years and changing world situations give armed forces different roles, and Turkey participates in all peacekeeping missions that are assigned by NATO (North Atlantic Treaty Organization) and the United Nations. While performing these roles, the importance of air mobility and the importance of reliability became widely appreciated. Moreover, the coming retiring age of the existing C-130s in the TUAFF forced the TUAFF to look for ways to improve its air mobility.</p> <p>Under these conditions the TUAFF is trying to find a way to decrease these interruptions in the missions and to increase the capability of carrying more personnel and materials so as to increase the effectiveness of Air Lift missions. There are two ways to accomplish this target: (1) Refurbish the existing C-130s and increasing its reliability, and (2) Buy the newest version of C-130 Hercules, the C-130J</p> <p>This study investigates the O&S cost difference among the aircraft by establishing a model to assess the O&S cost that can be used to evaluate the competing alternatives as well as the replacement decision for the existing systems. Cost Oriented Resource Estimation (CORE) model utilized in establishing the model. Sensitivity Analysis, and Breakeven Analysis are applied to the cost figures over 40 years. The analysis showed that C-130J amortizes itself in the lifetime of the cargo aircraft. In addition to that improved avionic, and propulsion systems in crease the efficiency and effectiveness of the air mobility.</p> | | | | | |
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