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THE IMPORTANCE OF THE LIFE CYCLE ESTIMATIONS IN THE MILITARY SYSTEM

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Abstract:
The impact of financial resources plan for acquisition programs needs to be assessed in the medium term and even longer because it may be that some equipment needed for getting one capability to have an acquisition cost less but their operation throughout the life cycle imposes high costs. These costs gathered with the cost of acquisition can exceed the costs during the life cycle of other equipment (wherewith they get the same capability) that initially purchase at a higher price but on the same lifetime operating costs were much lower.

Key words: life cycle cost, equipment, estimation, process

1. Introduction

In the current economic context a thorough analysis of the actual needs and the economic implications is necessary in order to meet these requirements. This will allow the programming of the financial resources made available in order to be able to purchase and operate the capabilities that you can afford.
Military capability is built on the basis of two fundamental elements: the people and equipment needed. In conclusion the military capabilities are inextricably linked to essential equipment, which are purchased within the procurement management system for defense. Such equipment must be effective, deployable, and able to work in an operational environment, reliable, interoperable, maintainable and bearable.

Before deciding on the purchase of a piece of equipment is required to be rated its impact in financial resources plan. This impact shall be determined by estimating the cost of equipment life cycle.

The impact of financial resources plan for acquisition programs needed to be assessed in the medium term and even longer because it may be that some equipment needed for getting one capability to have an acquisition cost less but their operation throughout the life cycle imposes high costs. These costs gathered with the cost of acquisition can exceed the costs during the life cycle of other equipment (wherewith they get the same capability) that initially purchase at a higher price but on the same lifetime operating costs were much lower.

2. The need for cost estimation of equipment life cycle

Costs of equipment life cycle are determined by the costs associated with the acquisition, operating or removal from service of military equipment. These costs with integrated logistical support, is an essential component of the concept of NATO systems life cycle management.

THE IMPORTANCE OF THE LIFE CYCLE COST IN THE MILITARY ACQUISITIONS

Through the systems life cycle management aims to optimize the capabilities of defense considering the performance, cost, quality, operational environment, integrated logistic support and physical wear during whole life cycle.

ILS is the technical and management process through which the needs for financial and logistic support of a system are identified throughout its lifecycle, and integrated in the content acquisition program.

The main aim of ILS is to obtain the necessary availability of the system, with a minimal cost per life cycle.

The LCC consists of all direct costs plus indirect costs associated with variable stages of life cycle of a system.

LCC includes exclusively the costs of introducing a new capability and is used as a minimum standard for the analysis of alternatives within the acquisition programs.

In the initial phases of the procurement programs, LCC values are estimated. They can be determined exactly only after these costs have been actually recorded as a result of development and evaluation activities which correspond to them. This situation is characteristic of advanced phases of the programs, in which the activities, especially of operating and support, have a repetitive character, which allows accurate recording of costs between two successive phases of the same activities.

For planning the necessary funds to support the activities, LCC values has to be known since the early stages of the programs. Because this, costs are estimated and are not known effectively.

We can meet two intentions to use the estimated LCC value:

- as a tool to assist decision in evaluating the feasibility and affordability of a program of acquisition;
- as a support tool and reference for budgetary planning process.

As you can see the second intention is for equipments which are already in the operating phase.

In the following we will focus only on the use of estimated LCC value as an instrument for deciding whether or not to purchase a product. Analysis of alternatives is conducted with total LCC Estimates and the risks associated with potential suppliers.

To analyze the influences that you may have it is necessary to know the module for determining the estimated LCC value or rather components of which it is composed. Only in this way we will be able to know in what direction to act in order to improve the spending of allocated funds.

The acquisition of military equipment comprises three phases: the study and selection of the concept, technological development, the production, installation and support.

Estimated LCC value corresponding to the first phase is characterized by a greater uncertainty, given the fact that in this phase are not known accurately all the costs associated with the production and operating military equipment. While the project progresses, this estimated is closer to the real value. The LCC is the basic element that can assess whether the program is feasible of financially point of view (amount required for all programs in funding at some point is less than the amount approved with this destination in the budget).

3. The process of estimating the LCC

For estimating the LCC is adopting a sequential procedure that takes into account the succession in time of the acquisition program phases. Summing these partial estimated leads to the final result.

For each alternative identified to the implementation of the program should be an estimated LCC to allow a global analysis of the cost/efficiency in order to identify and adopt optimal version.

Estimated accuracy for all variants of realization of the program must be equal/similar to facilitate a comparison as good between them.

Definition of cost elements taken into consideration for determining the LCC when you analyze a acquisition program is done using a structure divided of the costs (CBS).

CBS is a cost-sharing structure according to established criteria which may be particularized according to specific elements of the program.

4. Detailing the cost breakdown structure

CBS breaks down a program till the levels of detail on obtaining a useful tool for controlling management process.

By breaking down the program in smaller items are facilitated planning and programming of activities and the allocation of resources for its fulfillment.

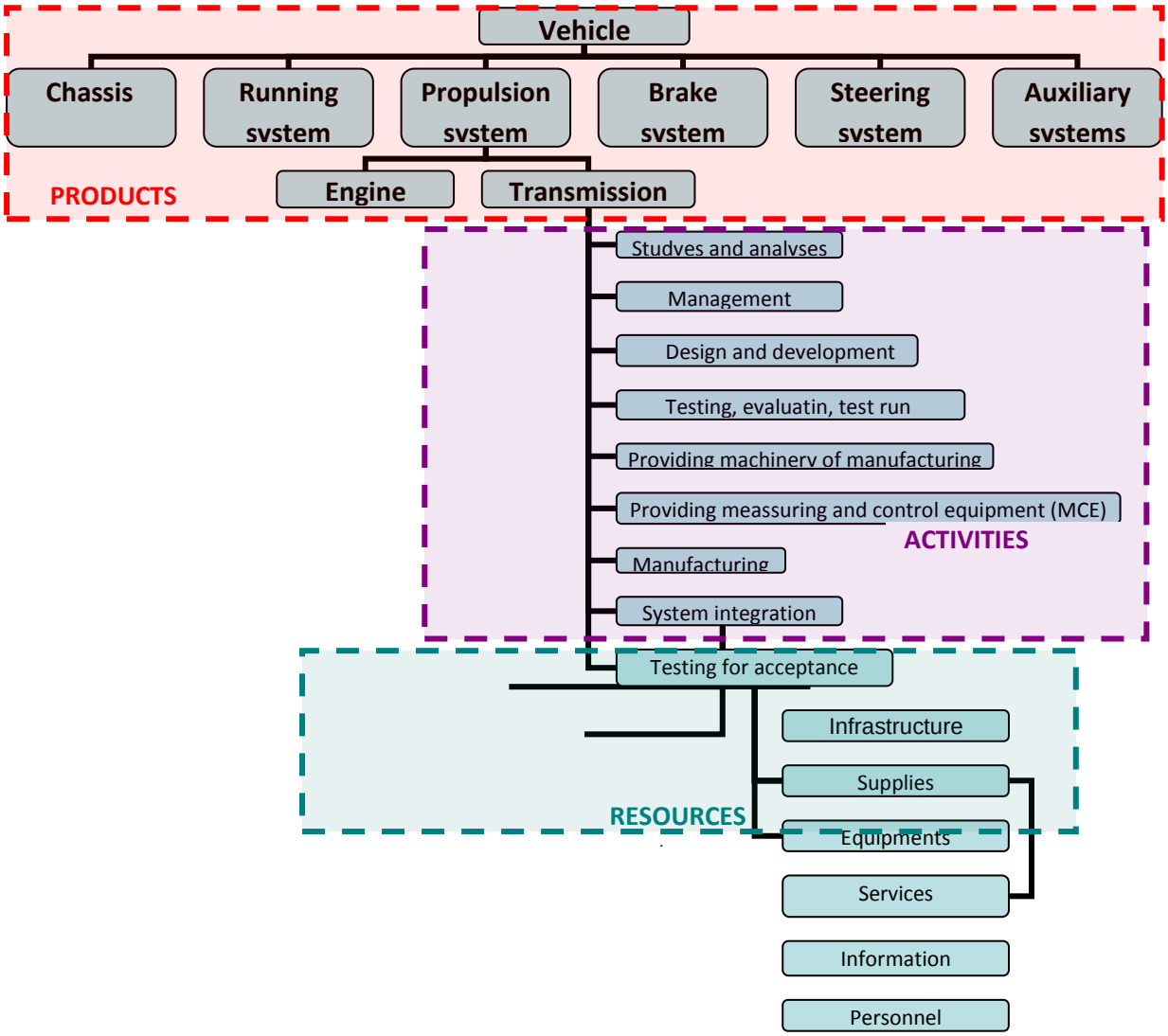

Fig. 1 CBS structure for estimate LCC

LCC can be divided, depending on:

- subsystems products/equipment;

- the activities required to be undertaken for developing and operating system/equipment in the various phases of the program;
- resources that support the implementation of one or more activities;
- phases of the program.

Specialist's recommendations are for the CBS structured depending on the subsystems products/equipment. This variant was found in course of time the most viable and easier to use.

In this way CBS can represent as an organizational chart and include on lateral branches, activities and resources in a hierarchical order, as shown in the figure above.

For CBS standardization, in order to facility comparison between estimated LCC values obtained for the same type of equipment or for similar equipment, in NATO was adopted the standardization name of activities and resources which appears in CBS.

In order to estimate the LCC, if it is necessary, we can divide CBS for activities and/or resources as in fig. below.

Example: Removal from service

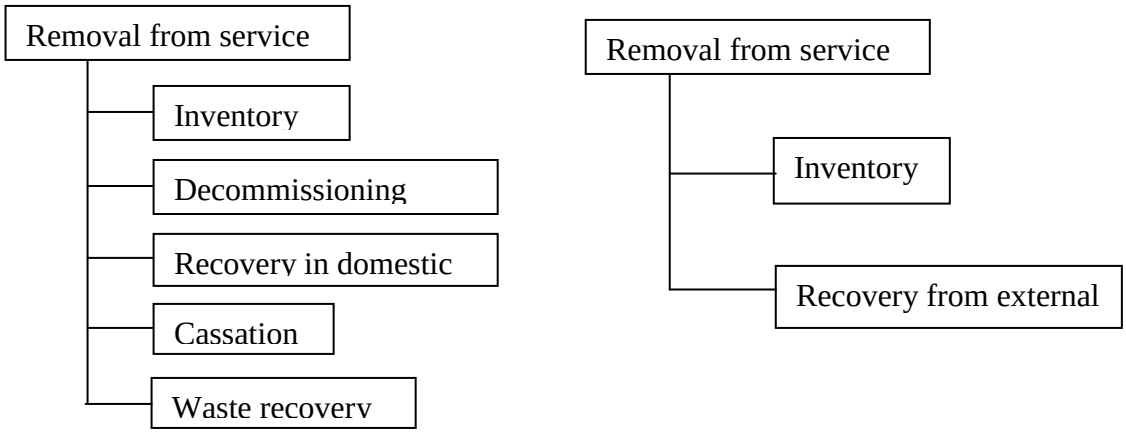

Fig. Detailing activities of CBS [2]

5. Basic rules and working assumptions

In the initial stages of programs the estimated LCC are based on limited information. Also technical, management and government policy changes affect cost. To compensate, in these situations, the lack of essential information for assessment process, it is necessary to formulate both a series of rules that make the connection between the information available as well as a number of working hypotheses that offers basic prerequisites for building estimated LCC.

Global sets of rules and working hypotheses of various programs, may have certain areas of convergence, such as:

- The timetable for implementation of the program;
- Factors which limit production process. For example: the unstable flow of financial resources, constraints on the number and quality of the labor force;
- Phase/phase of the program and the timetable for implementation;
- Labor cost inflation index, the reference year;
- The customer material in case of modernization.

In the field of program schedule, compliance/overcoming/advancing has a special importance on the final value of estimated LCC value.

If the management structure of the program imposes cost limits, rules and assumptions of work must take them into consideration, being reflected them properly in the process of obtaining estimate.

For programs that are running at the same time, the basic rules and assumptions of work must take into account the same basic economic indicators, since macroeconomic context for each programs is the same.

Particular basic rules and assumptions of work for each program refer to:

- Life cycle stages and operating conception/operational profile;
- The conception of carrying out maintenance;
- Acquisition strategy;
- Industrial base capacity;
- Except for the prototype, serial production and spare parts;
- Operating and infrastructure support needed;
- The availability of the necessary technology.

6. Collecting and processing of data bases

The main types of data used within the process of estimating the LCC is the data about the cost; the program activities and the technical data. The requirement for future increments depends, also, on feedback from users and technology maturation.

Data on costs are usually data on labor costs, materials, various investments and profit margins of the different activities.

Data about program activities influence total costs and may include data from the beginning and end of the activities, the delivery dates of components/assemblies important, data integration and assembly of important parts of the equipment, amending operational profile data, test and evaluation data.

Technical data which are needed for an estimated LCC refers to the physical characteristics and performance parameters.

7. Ways of estimating the LCC

Estimated LCC delivers to decider is provided, in essence, a numerical value that is framed in a sea of possible values. It is characterized by a certain probability of realization.

The range of variation of estimated LCC is obtained as a result of taking into account the effects of the uncertainties and risks.

In order to achieve a more exactly estimated LCC, it is calculated for each component element of CBS.

The process of estimating the LCC can use three main methods: estimation by analogy, the parametric estimation and estimation based on data design.

Choice of the method of estimation is done depending on the stage of the life cycle in which the program is.

The estimation by analogy, using the known costs of another program, which shall be adjusted to take into account the differences compared to the current program. It applies for the initial stages of the program when fewer data are available. Rough estimate of the LCC are obtained, but, the first interest is to know the size order of estimated value. This estimate should be developed at the end of the Program Definition Phase, when there should be sufficient architecture and engineering completed to support it.

The parametric estimation is done by expressing costs according to a set of technical, operational or cost parameters. The estimation is done by means of a statistical relationship. Apply to estimates of funding lines for building budgets. You can also apply for realizing optimization of performance/cost ratio or for prioritizing objectives.

Estimates based on data design build estimated LCC starting from the CBS elements. After estimating the cost of each element of the CBS, these costs add up to getting estimated LCC. Apply for estimating production or preparation of the negotiations for the acquisition.

8. Completion of the estimate of life cycle cost

To get an estimate of quality, it is necessary that this address to all phases of the program and any element of the CBS is not omitted, or, to be taken into account more than once (duplicate). Also the rules and working assumptions must be justified and explained.

Regarding these costs should not be undervalued or overstated. Estimate product must also be credible in the sense that it provides cost values in accord with historical data and market evolution tendencies of the same range.

Presenting the results of the process of estimating the LCC to management structure of the program, provides the tools for a decision on the identified development opportunities/desired product purchase.

The results of the process of estimating the LCC should be updated throughout the life cycle and a LCC Estimate will be completed to validate the budget in subsequent phases of the life cycle. Also, the results are used to create and update the documents necessary for carrying out the program of acquisition.

Among these are: the document with the needs of the mission; the study of the concept; operational requirements document; the acquisition program; acquisition strategy or plan providing ILS.

9. Conclusion

The generally objective for acquisition is to balance needs and available capability with resources, and to put capability into the hands of the user quickly regulatory and statutory requirements. This objective is carried using the most important **"tool"** which is life cycle cost estimate.

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