

Economic Time Impacts on HTMA



Fawzan F. AlEnizi, Abdullah M. Almodayan, Ahmed S. Negm

Abstract: *There are many stages in the medical device management lifecycle to consider, and from the planning stage to commissioning, dismantling and decommissioning, replacing an equipment is a critical decision. This phase includes several information that help replacement decisions intelligent. Technical, monetary and safety principles are taken into account when replacing medical equipment. One of the most frequently criterion is service life. In recent times, the delivery of a sustainable competitive advantage through the optimization of the management of non-essence activities is considered more relevant. A non-essence example is the Lifespan management of capital goods which are required in supporting the processes involved in healthcare operations ranging from acquiring assets to maximizing the operation, sustaining the performance and conclude the right time to get rid of it properly. The objective: is to identify if Total Cost Ownership (TCO) will give recommendations for decision-making even though it is capable of helping us identify the optimal economic life of the medical device. Overall, 40% of our specimens showed that monitoring TCO is essential to the continuous mapping of the cost of these devices on service.*

Keywords: *Economic Life Cycle, Replacing, Depreciation value, Economic Life time.*

I. INTRODUCTION

Health technology has undergone dramatic developments, these developments had a significant impact on the costs of technological investment and sustainability. Keeping up with new technology continues to play the most important role in increasing investment [1] [2]. Therefore, there is a need to create tracking and managing new technology operating costs. For this purpose, competency certificates have been produced by the organization and biomedical services have become one of the leading indicators of these certificates.

In a challenging environment where faster hospital service is expected and budgets are under pressure, healthcare systems are becoming more complex. However, the financial management and worth planning of medical devices would be the sole responsibility of the Healthcare Technology Management Administration (HTMA) in future health management policies. Therefore, HTMA has a primary mission that depends on tracking and the ability to control operational costs. [3] It is critical to pursue cost effective and sustainable health policies, considering the essentials, significances, resources and capabilities of health service development. [4] Financial resources have a decisive impact on the performance of the health system. [5] Medical Technology allows for the attainment of the highest quality care, and it remains a vital solution to the improvement of productivity and control of costs. HTMA has experience and professional employees to ensure facilities design so that medical technology and equipment are planned properly. HTM is present to provide effective and sustainable service plans in a timely manner that translates needs and vision into work and results While using advanced methods and tools to provide solutions and results in a small part of the usual time. Throughout the process, ample listening time is dedicated to the stakeholders while also keeping them up to date, and there is delivery of service planning solutions for each elements of the project. Regardless of the activities being carried out, HTM professionals impact the entire health system. HTM is noticeable to assume responsibility through its management of medical equipment, prediction needs, display, competitive definitions, market analysis, service area analysis, clinical planning for supply, detailed features and resource features, business condition development, feasibility studies, economic impact analysis, as we need to evaluate the following activities : The employee and regulatory definition files, organizational policies and procedures, care models and patient flow modes, and innovative procurement plans that leverage lessons learned from three integrated efforts:

- Project and Procurement:
- Maintenance
- Integration & Development:

The impact of medical device management can be compared to an asset. Assets are tools with monetary value. Anything owned or controlled by an individual, company, or country with the expectation that it will bring some forthcoming profit. Assets therefore represent the economic properties of the hospital. Towards improving the quality of medical services and making accurate cost projections, managers and decision-makers in the hospital rely on economic value information [6].

Manuscript received on 17 January 2023 | Revised Manuscript received on 23 January 2023 | Manuscript Accepted on 25 February 2023 | Manuscript published on 28 February 2023.

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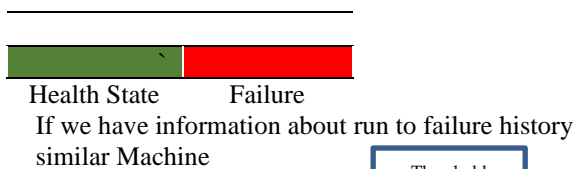
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Also, the well-organized distribution of resources and the capacity to strengthen the performance of the hospital relies on the hospital's cost. The hospital cost is also responsible for the provision of the information of set user with the adequate level of quality for the community. In addition, it may be valuable to implement a prepayment technique as a way to achieve better coverage while attempting to build up proprietary financing systems [7].

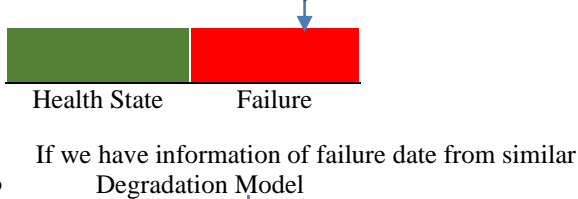
The healthcare system heavily depends on hospitals as they are responsible for the provision and delivery of health services as well as the training of health professionals. The utilization of funds for professional staff and medical devices also rests on hospitals because they are the largest financing source. Health Economic Evaluation (HEE) There are many effective and wealth while health intervention on program that be used to improve the health of population if we had A money to spend we can use it every beneficial health program. If money is spent on intervention, and there is none left for others, this is referred to as opportunity cost. As a result, there is a need to use the limited money left to make a decision that is beneficial. In making the best decision, the HEE is effective. For such decision, the purchasing price is just the tip of the iceberg as there are many other important costs to be considered, especially costs that are important for capital equipment procurement.

TCO = Purchasing price + costs incurred over the useful life
 = Pre Acquisition cost + purchase cost + running Costs + Maintenance Costs + Down Time Costs + End of Life cycle cost. There is the Remaining Useful Life (RUL) concept which involves the deterioration profile for a machine over time. Depending on the machine, time can be represented in terms of days/miles/cycle or any quantity. In determining the model to be used, attention would be paid to the available information. RUL Estimator Models:

- Similarity Model



- Survival Model

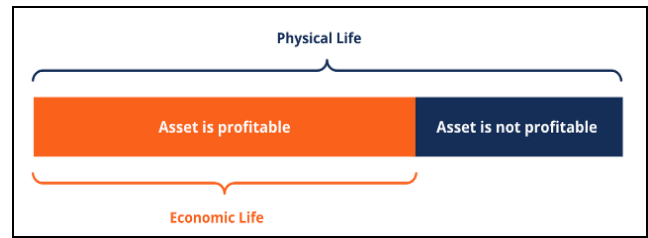


- Degradation Model



We have information about the threshold of same indicator that indicates failure The business climate is highly competitive and regulated in the healthcare industry is one that requires creative ways through which healthcare facilities can go for lower costs while ensuring that high-quality patient care is still provided. Economic life pointing to the expected useful life for the owner of an asset, this concept is also recognized as valuable

life or depreciation period. A measure of an asset's efficacy is how much profit it will make to hold it, i.e., the period during which the asset will generate more income than it expenses.



When calculating useful economic life, it is generally assumed that asset operations are determined based on normal usage levels that allow for preventative maintenance. In particular, the economic life of an asset is not always equal to its physical life, as it is not impossible for an asset to continue to function properly when it is no longer considered economically useful. Because the economic life is an estimate, the physical life of an asset may exceed its economic life and vice versa. This is true even when new innovations make old technology obsolete. To estimate this number, owners should consider the net present value (NPV) of the asset, the internal rate of return (IRR), and the return on investment (ROI). There are several factors that contribute to shortening or ending the economic life of an asset. For example, equipment wear, deterioration, or damage is a factor that shortens or shortens the economic life of equipment and increases maintenance and repair costs. Asset obsolescence occurs when new innovations and technologies replace current ones. The economic life of an asset can also come to an end as increased maintenance costs reduce its economic life and make the asset perform inefficiently compared to current alternatives.

The ability to effectively manage assets remains the key to economic life, and an important consideration in relation to the decision-making process of a healthcare organization to purchase new assets or replace current assets [8].

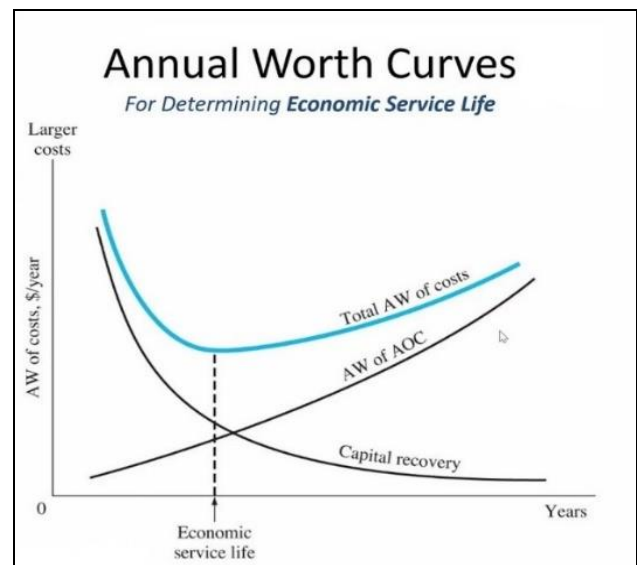


Fig. 1. Chart Showing Annual Worth Curves for Determining Economic Life



Costs in relation to the life of the machine is shown in [Figure 1](#). This indicates that the return on investment (average initial cost) continues to decrease over the life of the equipment. Also, maintenance costs increase with the life of the equipment. From the beginning the total cost decreases up to a certain number of lives, after which it starts increasing. Equipment life is the point corresponding to the lowest total cost. It can be realized that the longer the replacement is deferred, the lower the average cost per period. However, there is a period the average cost per period is likely to witness an increase, and a replacement at this point is justifiable. With time, the efficiency of a machine reduces and there is a need to figure out when best to go for a replacement, that is get a new one. If the interest rate is above 0%, use the interest formula to determine the useful life. Exchanges can be valued using a present value basis and an annual equivalence basis.

A machine's maintenance cost is given as an increasing over time, and its scrap weight is constant.

Since then, maintenance costs experienced during 'n' years have increased, =

$$\int_0^n R_t dt \tag{1}$$

T(n) = Total Cost experienced over „n“ years

The total cost incurred on the element will become:

$$T(n) = C - S + \int_0^n R_t dt \tag{2}$$

Where,

C = Property cost of the item,

R_t = Runing and Maintenance cost of the element at time „t“,

S = Scrap value,

n = number of years the element to be used,

Purchase price seems to be a ambiguous term in the procurement process, as demanding medical devices have a long lifespan. This position is supported by numerous studies based on total cost of ownership (TCO) approach [9].

For healthcare providers, an approximately five-year limit can be employed in planning the purchase of medical equipment, which includes software updates. During the procurement process, the necessary factors to consider are the safety criteria, the updates of the medical equipment, the efficiency of the device and utilization [10]. The TCO method takes into account all the cost items that need to be considered before purchasing technology. In addition to input costs, costs incurred during the operation and retirement stages of the device life cycle are also considered. TCO typically includes acquisition costs, energy, installation costs, routine maintenance, repairs, upgrades, staff training, liquidation, and labor costs (which should be evaluated, especially for new installations) [11] [12].

In many cases, the total cost of ownership of a medical device clearly exceeds the purchase price, so the TCO method appears to be suitable for evaluating the device in the procurement process) [11] [13] [14]. The TCO method has proven to be very useful for the valuation of large-scale capital goods, including sectors such as IT, construction and automotive [15] [11] [16] [17].

The TCO method is rarely factored into the decision making process in the healthcare system, and as a result, it is not standardized [10] [18].

However, there are certain benefits to enjoy if the total costs is appropriately identified, and these benefits include the rationalization of performance requirements, the ability to make informed decisions, determination of sustainability, reliability, maintenance support, as well as other factors that affect life cycle costs, and thus, the reduction of the total cost of the asset is achieved [19] [20].

Lifetime provides decision makers with the tools they need to monitor the condition of medical devices and remove/replace them from inventory in a timely manner.

We employ TCO to determine the radiological capital equipment and in future, we plan to expand our test to cover other sectors of medical equipment to accurately compare outcomes.

In accomplishing the research objectives, an economical time T_e analysis for selected medical Radiological devices was conducted. The TCO calculation process was based on the approach used in the studies of Morphonius [21] and Nierseen [19]. All costs are further discounted to the present value. The case study was also based on the Life-Cycle Costing Manual issued for the Federal Energy Management Program, which was used by Morfonios in his study [21].

The TCO process for the purpose study consisted of five basic steps [22]:

1. Evaluation of the life expectancy of the device
2. Identification of the types of evaluation costs
3. Calculation of charges according to the each types
4. Determination of the correlation among charges
5. Calculation of the TCO

$$TCO = Ca + Cc + Co + Cm + Cp + Cd \tag{3}$$

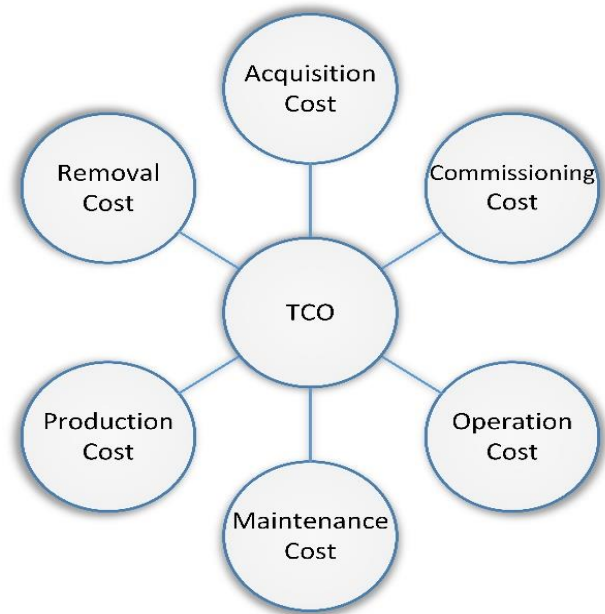


Fig. 2. Total Cost Ownership Component

Where:

- Ca- Acquisition Cost
- Cc- Commissioning Cost
- Co- Operation Cost
- Cm- Maintenance Cost
- Cp- Production Cost
- Cd- Removal Cost



The replacement of medical equipment ought to be determined by different criteria, and the first of such criteria is the technical criterion which includes indicators such as useful life time ratio, utilization, downtime, technological change, vendor support, etc.

The second is financial criteria, which may include service and operational costs, backup availability, etc.

According to these standards, the useful life of medical devices remains an important indicator of technical standards and is generally accepted as an important factor to consider when replacing [23].

II. MATERIAL AND METHOD

In the Middle East, KFMC remains It is one of the largest and fastest growing medical complexes with a total capacity of (1,200) beds. Its technical management team are highly qualified and efficient with the team's goal being making KFMC a benchmark in medical care. This is achieved by making KFMC the referral point for patients seeking different treatments or medical assistance from all over the region, and by being known for medical and professional competencies of different disciplines delivered annually to an estimate of over 30,000 inpatients and 500,000 outpatients. As a result of KFMC's working environment which allows it have qualified employees, it provides, overall, more quality care and commitment to dealing with patients [24].

As regards HTMA Mission, it is to ensure the provision of distinctive, high specialty, safe and cost-effective use of healthcare technologies in KFMC. The vision is to be the benchmark of health technology through the application of international standards [24].

HTMA manages 36,347 medical devices, and these devices are controlled and monitored through 4 different sections (Bio-Laboratory, Bio-Mechanical, Bio-Electronics and Bio-Radiology)

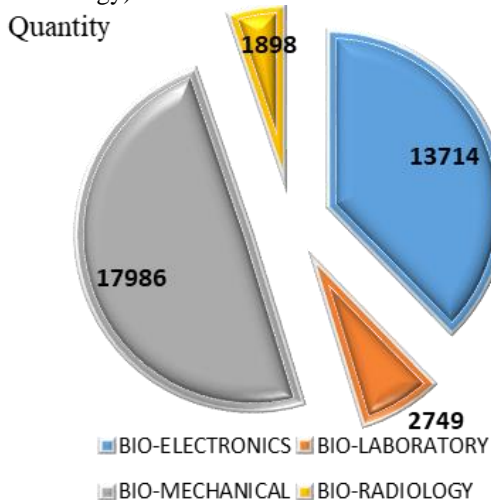


Fig. 3. Medical Equipment Categorization and Quantities in HTMA KFMC

HTMA own management system AssetPlus GE Healthcare's Asset Management Solution to make work more effective, AssetPlus is a versatile solution that combines multiple intuitive and easy-to-use technologies designed for hospital teams. Biomedical Staff, General Technical Services, Medical Technicians, Financial Services, Information Technology Departments, Nursing Teams [25].

Medical equipment management remains an important aspect of the healthcare system. [26] It is a process that is used by hospitals to establish, supervise and manage existing equipment for the promotion of safe, effective, and economical use of equipment [27]. There are several stages involved in the life cycle of medical equipment management, To ensure the protection of people and the environment, it is important to follow established safety procedures when disposing of or replacing medical devices.

An ideal medical technology replacement planning system would cover all clinical devices across the facility, leverage accurate and objective data for analysis, and be flexible enough to consider non-device factors. There is. It is also futuristic if it includes strategic plans related to clinical market trends and strategic initiatives by hospitals related to technology [27]. [28] An analysis procedure for replacement: In answering the question of how long to use equipment or when to discard an old piece of equipment, the simple answer remains when the performance of that equipment has become compromised.

i. Reduced Performance (reliability / productivity) eventually results in higher operating costs, decreased safety, lost sales, and diminution quality.

Also, replacement of equipment should come into the picture when the repair costs are high or when it is no longer safe to use the old equipment and there is now reduced quality of operation.

Another possibility could simply be that the old equipment no longer meets new specifications

ii. Altered requirements: This refers to new specifications that cannot be met by existing equipment.

iii. Obsolescence: The improved performance of newer technologies makes the current equipment less competitive.

There is an employment of a quantitative procedure that identifies how long to own equipment and in the process, a look into the cost of ownership is considered. It is important to note that costs to own something extend to the operating costs and it is just not about the initial upfront expense of buying that item. Total ownership comes from:

- The capital recovery represents the amount of an annualized equivalent of the initial purchase price minus the sales price in the future.
- The ongoing maintenance and operation costs

The procedure of finding the annual operating costs for each individual year and then you combine it all together and spread it out evenly over the entire life span so that it's an equal amount. The annual worth of the annual operating costs, so here AOC means annual operating costs, and over time, operating costs go up and capital recovery costs get lower and lower the more years you own an item.

The medium of optimum operating point is the so-called economic life, the technical definition of which is the number of years that minimizes the total annual cost. So how long should you own the equipment? It should be owned for many years to minimize the total annual cost. Determining the carrying value of an asset can be done through various types of depreciation charges. The most common depreciation methods are:



1. Straight-line SLN
2. Double declining balance DDB
3. Declining balance DB
4. Sum of years' digits SYD

In accounting, depreciation is used to distribute the cost of an item of property, plant and equipment over its useful life. In other words, the depreciation of an asset over time due to use, wear and tear, or obsolescence. His four main depreciation methods mentioned above are detailed below.

CA = Cost of an Asset

RV= Residual Value

UL= Useful life of an Asset

P = Period

$$SLN = (CA - RV)/UL. \tag{4}$$

$$DDB = \text{Min} ((\text{cost} - \text{total depreciation from prior periods}) * (\text{factor}/\text{life}), (\text{cost} - \text{salvage} - \text{total depreciation from prior periods})). \tag{5}$$

$$DB = ((CA - \text{total depreciation from prior periods}) * \text{rate} * (12 - \text{month})) / 12 \tag{6}$$

$$SYD = [(CA - RV) \times (UL - P + 1) \times 2] / [(UL) (UL + 1)]. \tag{7}$$

In a replacement study, alternatives will be compared— you will compare the thing that you already own which is the defender to a potential replacement which is called a challenger

- Defender: The currently installed asset
- Challenger: The best potential replacement
- The market value: This is the value of a piece of equipment that you already own if it were to be sold today.
- Economic Service Life (ESL): This is how long you should own the item. The number of years at which the lowest annual worth of cost occurs.

- Defender the first cost. is its current market value?
- Challenger First Cost: The actual purchase price of any equipment.
- Sunk Costs: Previous expenditures that cannot be recovered in the future or previous expenditures that don't have a direct relationship with the current value of the item.

In determining the economic service life, the market value is going to be considered so as to calculate the capital recovery costs for each year of ownership and then factor in the operating costs and annual worth of the operating costs.

- Present value of cumulative operating costs
- The annual worth of the present value of the cumulative operating costs
- Capital recovery column
- Total annual worth of costs

If the prices look like they're going up again the total cost of ownership is increasing because the operating costs are going up. What to look for is the minimum amount, that is the lowest cost, and this gives you the economic service life. Based on this, the equipment should be owned for three years or the economic service life of the equipment is three years. Thus, the economic service life means the ideal number of years that minimizes the costs. Below is the analysis:

Y= Year for working

MV= Market Value if sold in a certain year

OP= Operating cost for a certain year

NPV= Net Present Value of cumulative operating costs to date

AW. PV= Annual Worth of Present Value of cumulative cost

CR= Capital Recovery

AWC= Total Annual Worth of cost

Table 1. Example how AW for Economic Service Life

Y	MV	Op	NPV	AW. PV	CR	AWC
1	10,000	- 5,000	- 4,545	- 4,999	-12,000	- 16,999
2	8,000	- 6,500	- 9,917	- 5,714	- 7,714	- 13,428
3	6,000	- 8,000	-15,928	- 6,404	- 6,229	- 12,634
4	2,000	- 9,500	-22,417	- 7,071	- 5,878	- 12,950
5	-	- 12,500	-30,178	- 7,960	- 5,275	- 13,236

$$MV = PC_{i=0} \times r \tag{8}$$

r= Interest Rate %

i= no of Years

PC= Purchasing Cost

$$OP = C_{sp} + C_{em} + C_{cnt} \tag{9}$$

C_{sp}= Cost of Spare Parts

C_{em}= Cost of employment

C_{cnt} = Cost of contract

$$NPV = \sum_{i=1}^n \frac{OP_i}{(1+r)^i} \tag{10}$$

n = certain year of evaluation

$$AW. PV = PMT = PV \left[\frac{r}{1 - (1+r)^{-n}} \right] \times \left[\frac{1}{(1+r)} \right] \tag{11}$$

PMT = Payment Value at certain time

PV = Present value

$$CR = r \times n \times (-PC - MV) \tag{12}$$



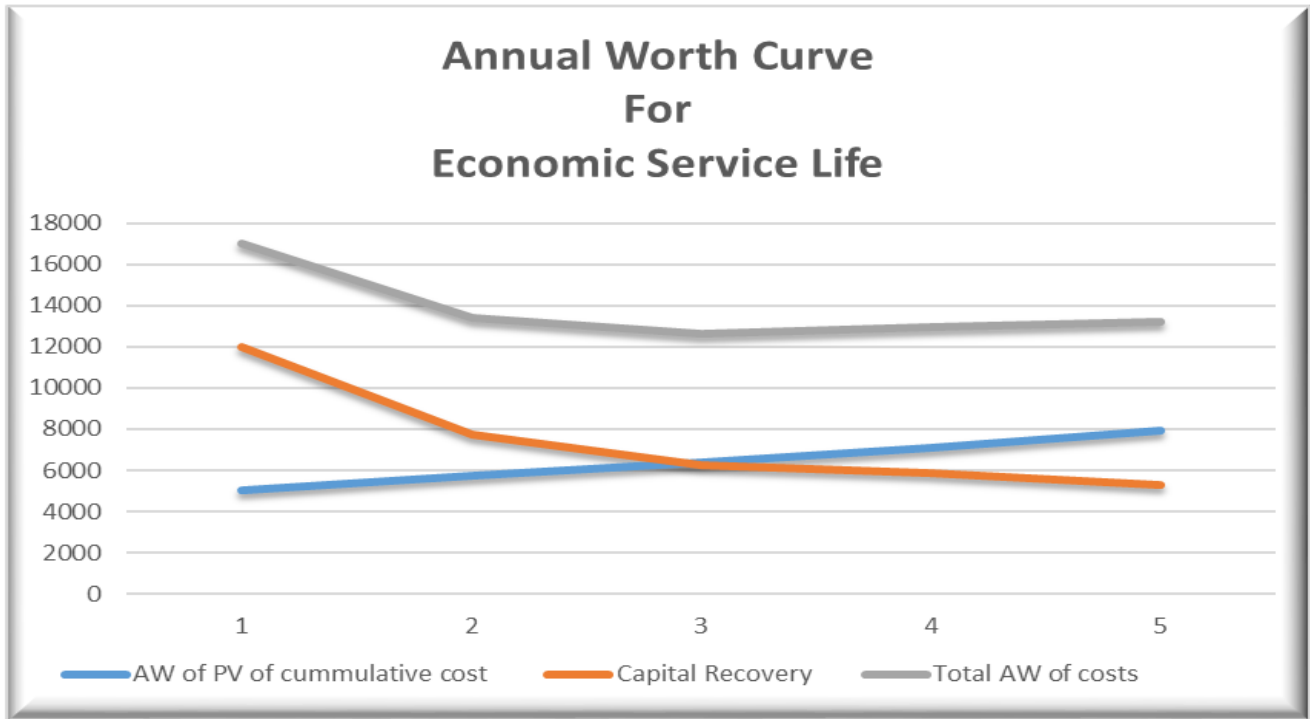


Fig. 4. AW for Economic Service Life

III. RESULTS AND DISCUSSION

Variuos organizations have at temped to estimate typical equipment lifetimes for healthcare technology. This annex contains the results from two different sources – the American Hospital Association, and the GTZ (German Government Technical Aid Agency) [29]. The work frame of both organizations includes providing guidance that relate to the life span of medical equipment. The result shows that it is important for replacement to be considered for equipment once it is the end of its useful time. Also, the equipment is due for disposal once it is discovered that the service costs has increased. The proposed comparison was applied on Bio-Radiological capital equipment Data; KFMC has 33 devices with different types for 4 hospitals, National Neurosciences Institute and 3 specialized centers. Our focus now will be on radiological equipment.

Here is the list of equipment types that were part of our interest in this research:

- Radiotherapy Simulation Sys, Computed Tomography-Based
- Scanning Sys, Gamma Camera, Single Photon Emission Tomography
- Scanning Sys, Computed Tomography
- Radiographic/Fluoroscopic Sys, Angiographic/Interventional
- Radiotherapy Sys, Linear Accelerator
- Scanning Sys, Gamma Camera
- Radiographic/Fluoroscopic Sys, Cardiovascular
- Radiographic/Fluoroscopic Units, Mobile
- Radiographic Units, Mobile
- Radiographic Sys, Digital

While doing assessment for any device, we in HTMA, in previous years, usually concentrate on the availability of high performance machine so as to not affect people who are seeking to use this service in our organization.

Maintenance are a main concern while their doing them work is to assess the spare part that used to repair the machine at certain time comparing its cost to equipment price which may miss lead them in their decision, although the planning of purchasing usually consider Standard for equipment Life Span and how much time the corrective work order has been taken for these machines which also may lead to less precision in their decision of change the machines.

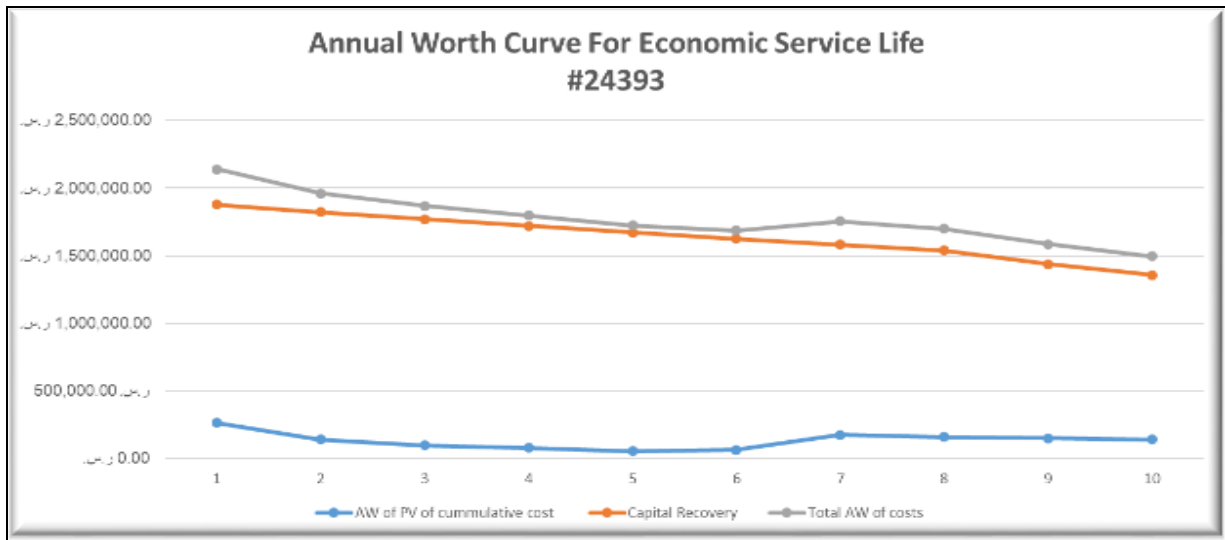


Fig. 5. AW for Scanning Sys, GAMMA CAMERA, SPECT

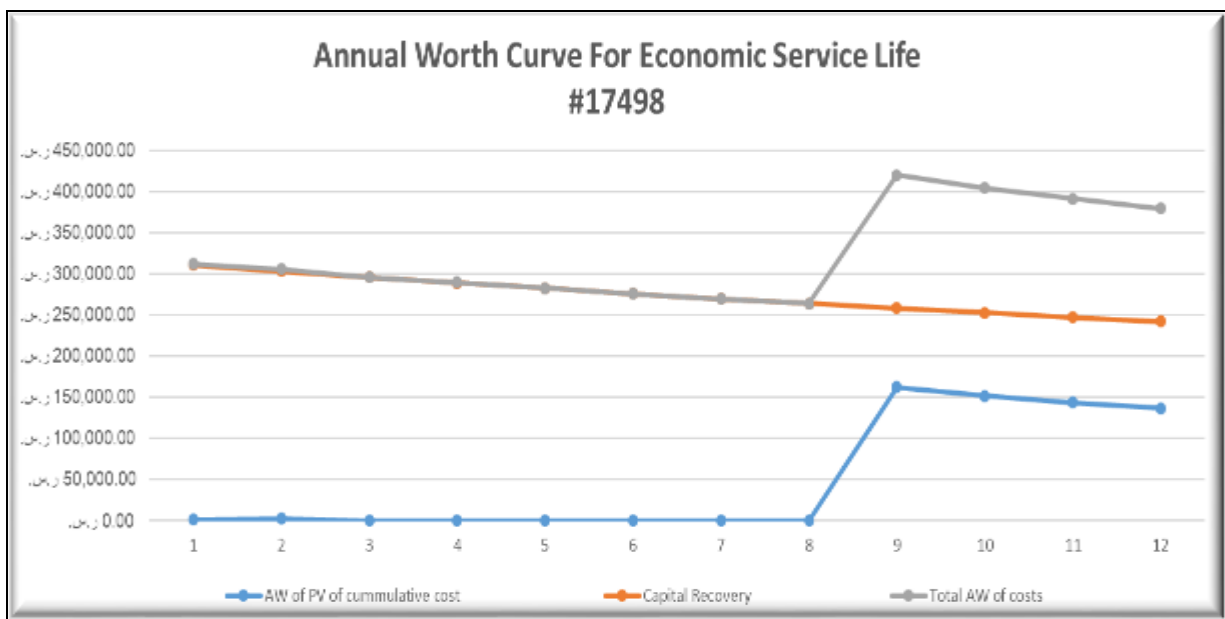


Fig. 6. AW for Radiographic Sys, Digital

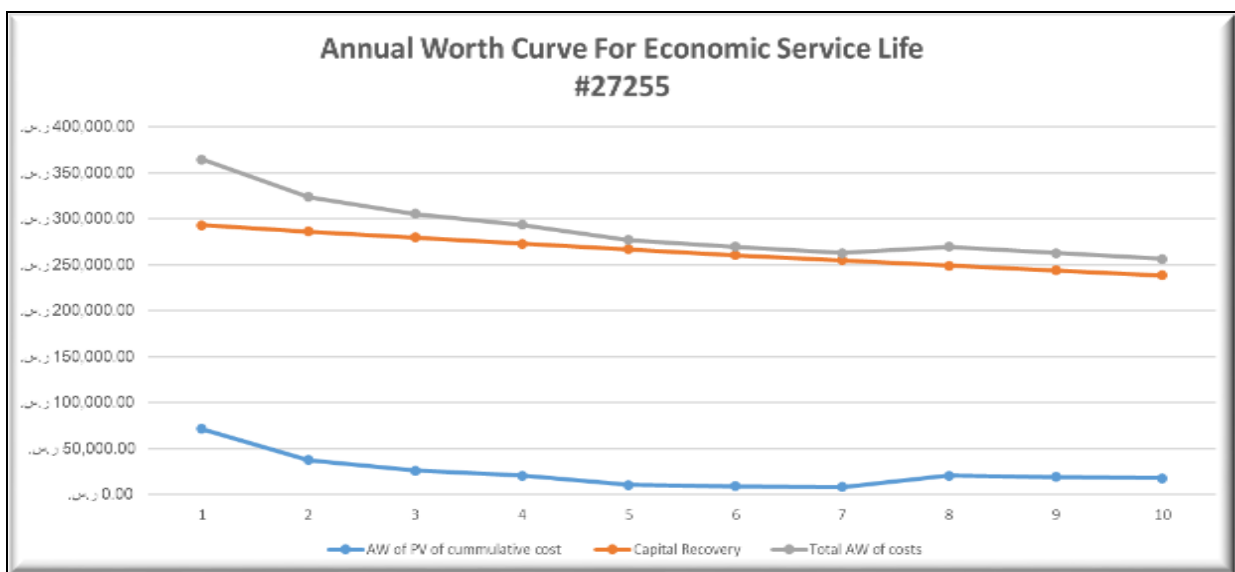


Fig.7. AW for Radiographic Units, Mobile

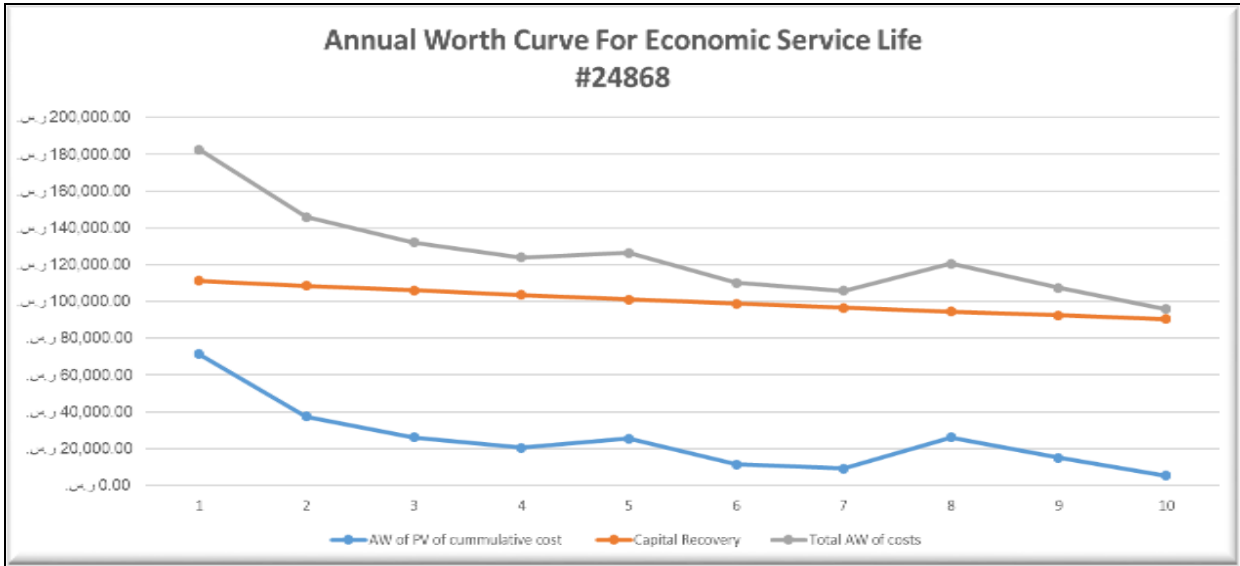


Fig.8. AW for Radiographic/Fluoroscopic Units, Mobile

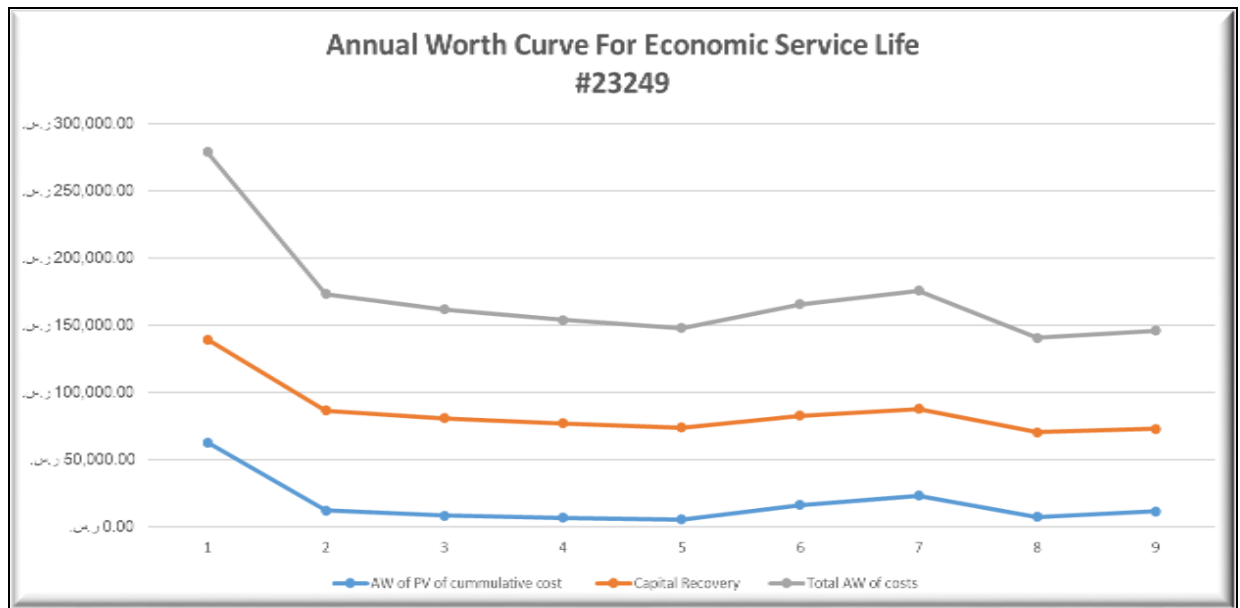


Fig.9. AW for Radiographic/Fluoroscopic, Mobile

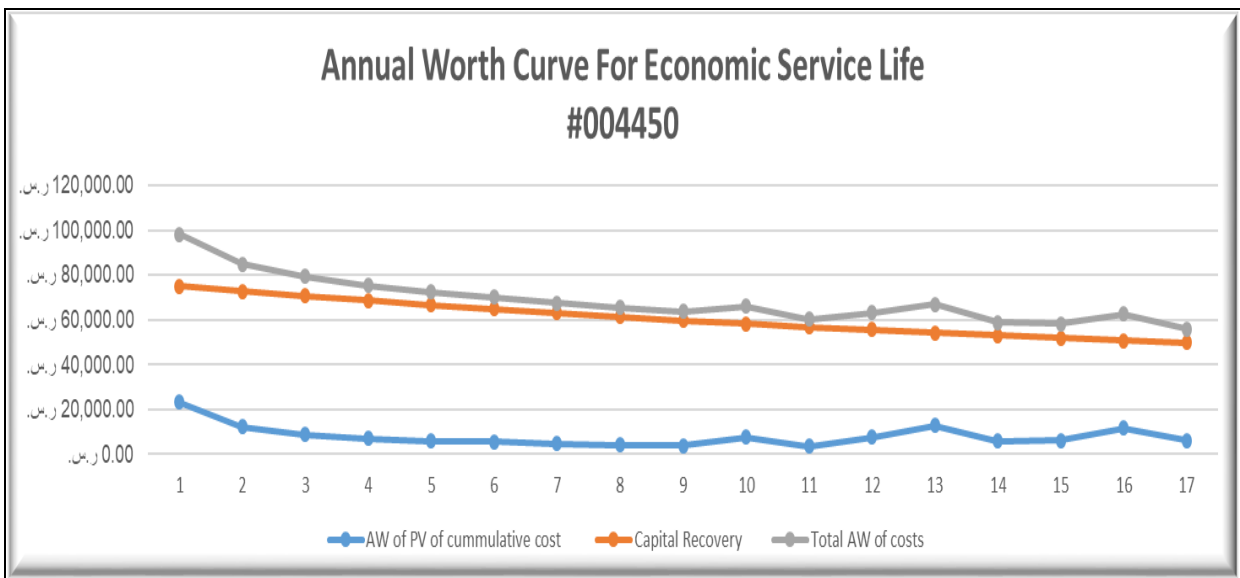


Fig.10. AW for Radiographic/Fluoroscopic, Mobile

Table 2. Economic Life Time Effect on Service Life Time

#	Equipment Name	Q	E.T
1	Scanning Systems, CT	1	6
2	Scanning Systems, Gamma Camera, SPET	1	8
3	Radiographic Systems, Digital X-RAY	5	7
4	Radiographic Units, Mobile X-RAY	6	4
5	Radiographic /Fluoroscopic Units, Mobile C-ARM	4	9

Table 3. Economic Life Time Match with Expected Life Time by Standard for Medical Equipment

#	Equipment Name	Q	E.T
1	Scanning Systems, Gamma Camera	1	8
2	Radiographic /Fluoroscopic Systems, Angiographic/Interventional	1	7
3	Radiographic /Fluoroscopic Systems, Cardiovascular	1	7
4	Radiotherapy Simulation Systems, CT-Based	1	10
5	Scanning Systems, Gamma Camera, SPET	1	8
6	Scanning Systems, CT	2	7
7	Radiographic /Fluoroscopic Systems, Angiographic/Interventional	2	7
8	Radiographic Units, Mobile X-RAY	1	10
9	Radiotherapy Systems, Linear Accelerator	2	7
10	Radiographic /Fluoroscopic Units, Mobile C-ARM	4	8

The survey effects display that the control of healthcare centers, clinical technicians, physicians and economists are those who're the maximum concerned with the manner of procurement of costly clinical equipment. This corresponds to the pointings of Konschak [28], however the illustration of economists withinside the evaluation of long-time period funding ought to be plenty higher. The shopping rate become the maximum common choice parameter some of the healthcare centers inquired, probable because of the long-hooked up manner of comparing public procurement. At present, the evaluation of bids in public procurement manner makes use of the precept of "maximum economically effective tender". For the assessment of the healthcare equipment, it could be executed the use of the pleasant of the provided answer and its reliability, the bottom bid rate, the variety of service, etc.

The frequency and the motives, for deciding on complete provider contracts, are just like those that may be discovered withinside the to be had literature. Sferrella states that the maximum not unusual place motives for negotiating complete provider contracts from deliver corporations are as follows: carefree operation, assure of response, and bargain at the provider settlement while signing the settlement collectively with the acquisition of the instrument [30]. TCO turned into calculated for decided on devices, which constitute the entire life of the instrument. It has already been tested presently that operational value outweighs the purchase value. The value object that still appreciably accelerated the TCO turned into the provider and restore value group. Therefore, it is able to be concluded that the buying enterprise have to additionally recall the scope of the negotiated provider settlement. In addition, we have to get

worried and fitness care centers have to give attention to selecting a dealer of consumables, as observe effects reveal that those gadgets have been the various 0.33 maximum vital class in TCO. Personnel charges covered withinside the TCO calculation is an object this is usually covered into operational charges [28]. It have to be cited that withinside the case of current operation, this object have to be taken into consideration inappropriate and brought under consideration withinside the normal calculation most effective in phrases of extra salary charges (incremental). The inclusion of employees value into the calculation is suitable, specially for brand new departments.

During the tool operation, it's also really helpful to remember the wide variety of examinations and to tune the common working charges in line with examination. The approach also can be supplemented via way of means of tracking marginal charges, i.e. charges incurred with every incremental unit of output (wide variety of such units) [31] [32].

The above graphs of annual worth for economic service life is depend only on HTMA data about costs of purchasing, installing, servicing and spare parts used for these machines regardless the cost of operation as manpower for running these equipment from medical staff and their assistant consumables cost that may be used for running these equipment. Despite the fact that the annual worth for economic services life is high, critical technique should be included in HTMA consideration because calculations show it remains an effective technique for monitoring each and every single device in its entire life span.

IV. CONCLUSION AND FUTURE WORK

Economic time of medical equipment is essential to be used for enhance the medical equipment management decision. Radiological gadget turned into decided on for the functions of the case examine. Te for decided on gadgets have been recognized with the assist of scientific technicians and bosses on the Department of Medical Technology. The listing of price gadgets involved for the chosen gadget is offered in [Table 1](#). The financial time technique turned into unknown to maximum of the respondents and the respondents normally make selections primarily based totally on financial price of scientific gadget. The working price of gadget lifetime for the gadgets decided on for the case examine is similar to the acquisition price. According to the calculated TCO, this parameter isn't the handiest essential price motive force withinside the existence cycle of scientific gadget in hospitals. The Economic Life method is useful withinside the case of strategic decision-making regarding acquisition of specialised distinctly particular technologies, wherein sustainability is the precept decisive factor. When the era comes on the idea of a subsidy or donation, Te can suggest the probable economic burden connected with its operation and renovation all through its lifetime. Further studies is recommended, mainly withinside the subject of working expenses and withinside the vicinity of techniques for estimating price gadgets. The financial price turned into stimulated with the aid of using the usage of scientific gadget in medical institution offerings with the aid of using the patients, the performance of to be had resources, the kind of scientific offerings supplied, and the scientific exercise of the physicians. Variation turned into additionally observed among strategies in making use of Te. The findings supplied the simple records concerning the financial price healthcare price in public hospitals whilst making use of the green usage of the to be had resources.

ACKNOWLEDGMENT

We would like to express our gratitude and thanks to King Fahd Medical City and its professional scientific work system that harnesses all its resources to support research and urge and encourage researchers to produce their research. And highlight their contribution to the community.

DECLARATION

Funding/ Grants/ Financial Support	No, I did not receive.
Conflicts of Interest/ Competing Interests	No conflicts of interest to the best of our knowledge.
Ethical Approval and Consent to Participate	No, the article does not require ethical approval and consent to participate with evidence.
Availability of Data and Material/ Data Access Statement	Not relevant.
Authors Contributions	All authors have equal participation in this article.

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