
3 ENTERPRISE ASSET MANAGEMENT (EAM)

3.1 THE DEFINITION OF ENTERPRISE ASSET MANAGEMENT

A look at the balance sheet of most manufacturing companies reveals that the biggest financial assets are Plant, Property and Equipment (PPE), followed closely by raw materials and finished goods inventory. Plant, property and equipment are referred to as assets on a company's balance sheet. For the purposes of this study, assets are understood to be anything that is tangible, has capital value, can be repaired, and is sequenced or scheduled with other assets in such a way as to be able to create a product or provide a service. This is a broad definition that needs further clarification. Companies have their own cut-off points for capital purchases. A good rule of thumb for South African companies is any purchase of a commodity that has a value over R5, 000 or R10, 000. This on its own does not make it an asset especially when the additional requirement is that it needs to be repairable. This disqualifies consumables and line replaceable items (spares). Capital value implies that an asset has a life expectancy and is usually expressed in financial terms as a rate of depreciation. The rate of depreciation differs for each type of asset and can be anything from 20% to 5% or a life expectancy of 5 to 20 years. A good financial practice is to place assets on an asset register. This does not mean that assets are fixed at a location but can be rotated within fixed locations or they can be mobile.

Every asset has an unique lifecycle that begins with its sourcing, transition through various phases, and disposal at the end of its life expectancy. Life cycles vary for different types of assets. As an example, personal computers have very short and buildings very long life cycles. It is important for companies to gain the best return possible from a procured asset. Investment success is measured by financial terms such as ROI – Return on Investment and ROA – Return On Assets and use formulations such as Total Cost of Ownership (TCO), Life Cycle Cost (LCC) to benchmark, measure, compare and report on assets. There is a discipline that specialises in the management of assets. It is referred to as Enterprise Asset Management or EAM. Enterprise asset management is defined as the discipline of improving the ROI and ROA of capital-intensive assets through their effective and efficient management.

3.2 THE BUILDING BLOCKS OF EAM

Depending on the purpose of an asset the traditional life cycle phases are:

- Plan
- Acquire
- Install
- Operate
- Maintain

- Dispose

An asset lifecycle phase usually begins without knowing the specifics of an asset or being in possession of it. In the “plan” phase a plant is designed, plans given for its erection, and concludes with reasons for its desirability, and the specification of assets. To acquire an asset you need to source and procure it. There are several ways of sourcing an asset and this can involve a tender or bid process (depending on the asset complexity), Requests For Quotations (RFQ), or an off-the-shelf selection. Once the supplier is chosen the asset is purchased. The supplier can educate the customer on the installation, operation and maintenance of the asset or may be contracted to help with the installation. Managing the asset is traditionally the responsibility of the user. Ownership deals primarily with operating and maintaining the assets and ends with disposal or replacement. Asset disposal frequently coincides with repeated failures, a catastrophic failure or obsolescence that results in a reactive termination, rather than a strategic replacement based on a proactive analysis.

In simple terms the purpose of EAM is to maintain or increase asset value through its many lifecycle phases [Basset, 2001]. To increase asset value requires a process of continuous improvement using optimisation techniques. Is there a business case for asset optimisation? The ARC Advisory Group [Bassett, 2001] studied the benefits of optimisation in each life cycle phase of large capital assets.

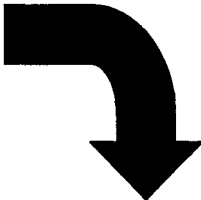
PROFIT	LOSS	% LIFE CYCLE	% TCO	ASSET OPTIMISATION 
	Plan	2	10	
	Acquire	1	40	
	Install	2	10	
Operate		90	20	
	Maintain	3	15	
	Dispose	1	5	
PROFIT	LOSS	% LIFE CYCLE	% TCO	SAVINGS
	Plan	1	5	50%
	Acquire	1	70	10%
	Install	1	5	50%
Operate		95	15	25%
	Maintain	1	5	65%
	Dispose	1	0	10%

Table 2: Effect of Asset Optimisation on Large Capital Assets

According to the Profit & Loss scorecard [table 2] the operate cycle is the only phase that contributes towards the return on investment of an asset and is by far the longest lifecycle phase. There is only one

way to increase asset profitability and that is by reducing the lifecycles of the loss centres in favour of the profit centre. This means that if we accept that the life expectancy of an asset remains unchanged, optimisation must drive down the life cycle percentage in the plan, acquire, install, maintain, and dispose phases in favour of the operate phase. The study shows savings obtained through optimisation in all phases. The highest saving area is undoubtedly the maintenance of an asset and the highest contributor toward the profit centre. A saving of 65% reduced the total cost of ownership on maintenance from 15% to 5%.

The study shows that on average a saving of 35% can be achieved with asset management throughout the total life cycle-phases of an asset. Optimisation can dramatically effect the total cost of ownership and normalises the spend on an asset. This is illustrated in the acquisition of an asset by normalising the TCO from 40% to 70%. What the study does not comment on is the increase in the life expectancy of an asset that results from asset optimisation.

It is seldom that a company starts with asset management from the inception of a plant. Several interest groups are involved with erecting a plant and include financiers, governmental organisations, engineering companies for design, construction and building companies to erect, and the owner of the plant referred to as the Client. Few companies have the capabilities (luxury) to design, finance, erect and operate a plant. Due to this, companies with a proactive management will opt to initiate asset management once the plant has been commissioned and handed over to the owner. In most cases asset optimisation becomes part of a company's savings and optimisation initiative when the headline earnings of a company start to drop. This can be several years after the plant was erected.

Most lifecycle phases are overhead functions such as planning, acquisition, installing, and disposal. As discussed, asset management usually only becomes important to a company after the plant has been commissioned. In such a case the benefits of asset management are lost in the initial phases of planning, acquisition and installation. When applied, asset management will reduce the TCO on disposal from 5% to zero. Asset management is therefore reduced to the operating and maintenance phases of an asset but still has major cost savings opportunities due to asset optimisation and best practices.

The report shows that the biggest TCO savings are achieved in the maintenance life cycle phase of an asset. That, and the fact that asset management usually comes into its own after the plant is commissioned, results in asset management being associated with the maintenance cycle of an asset. What the results of the study does not consider is the interdependency between assets. In a manufacturing plant, assets are placed in series with one another with little or no back-up systems in case of a failure. The result is that an upstream or downstream failure of one of the assets halts the operating process thereby reducing the profitability of a company. If we consider a network of four

assets in series the reliability of the process is the product of reliabilities for the individual assets and is expressed as:

$$\text{Overall Reliability } R_s = (R_1) (R_2) (R_3) (R_4) \tag{3.1}$$

As an example, suppose the four assets have identical reliabilities of 97%. The 97% is based on a 3% downtime for maintenance as per table 2 and represents the asset reliability before asset optimisation. The overall reliability for the four assets is:

$$R_s = (0.97) (0.97) (0.97) (0.97) = 0.89 \text{ or } 89\%$$

Suppose the benefits of optimisation are used in the calculation. The reliability of the four assets now stands at 99% based on an assumed 2% increase due to asset optimisation. The overall reliability for the four assets now becomes:

$$R_s = (0.99) (0.99) (0.99) (0.99) = 0.96 \text{ or } 96\%$$

This demonstrates that when assets operate in series they must operate with high reliability to benefit the total system availability. It shows that asset management per individual asset is important but that we need to extend the approach and consider how assets interact with one another. Maintenance is a plant activity and not only asset based. In the case of an individual asset reliability of 97% the overall reliability dropped to 89%. The effect is that an asset with a reliability of 97% now has an availability of 89% due to the effect of upstream or downstream failures. A 2% increase in reliability lifts the system availability from 89% to 96% - a difference of 7%.

3.3 THE EAM MARKET

The term “enterprise” is used to describe organisations that own capital-intensive assets and utilise them to earn an income. The majority of companies in all sectors of the economy own assets and use them directly or indirectly to create revenue. What truly distinguishes an asset intensive from a service-oriented organisation is the procurement costs of maintenance and repair materials relative to operating materials.

Figure 8 [DNA EAM] illustrates this principle by plotting the procurement cost on maintenance, repair, and operating materials within several industries. The banking industry is a service-based industry with limited assets. The majority cost is on operating materials such as paper, stationery, ink cartages and a limited cost on maintenance and repair materials such as buildings, air conditioners, and personal computer spares to retain the function of their assets.

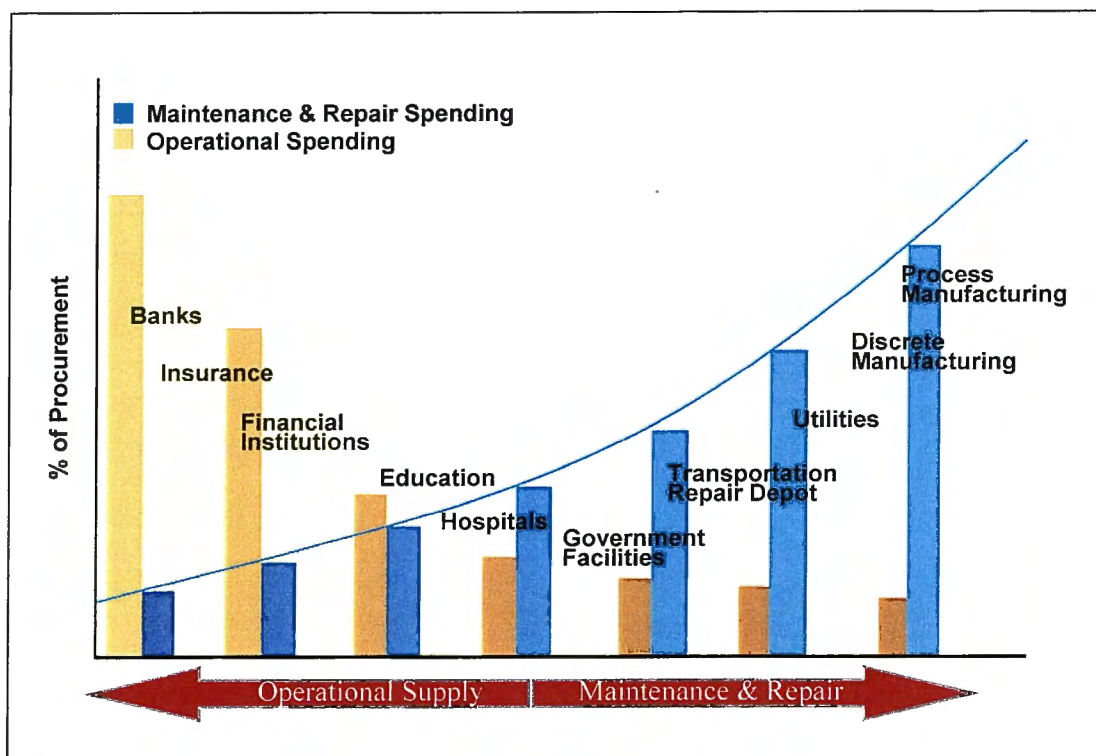


Figure 8: Procurement Spend (Maintenance & Repair versus Operating)

On the opposite side we have the manufacturing industry. They have considerable investments in assets and the greater cost is spent on retaining the asset function and value through maintenance and repairs. Maintenance and repair costs are on bearings, lubricants, fan belts, nuts and bolts to name but a few items.

3.4 ENTERPRISE ASSET MANAGEMENT (EAM) OUTSOURCING

We have stated that an organisation's approach to EAM is a matter of timing. Forward thinking companies seldom have the opportunity to start asset management before a plant is handed over to them. In a worst-case scenario, companies whose profits are under pressure initiate asset management several years after the plant is commissioned. Due to this EAM has become associated with the maintenance life cycle of assets.

The contribution of maintenance to the overall performance of a company is not always correctly understood. On the one hand, high-quality maintenance is often absolutely necessary for overall, long term company profitability and survival. No sophisticated production system can endure very long, or at least very well for very long, without a well-run maintenance program. The more maintenance contributes positively to the overall strategic goals of an organisation, the less noticeable it becomes to management. On the other hand, poor maintenance programs can obstruct the addition of value, retard the advantage of a capital resource, and destroy a business strategy. Sound maintenance programs can

enable other organisational resources and competencies to fulfil their potential. This explains why most maintenance departments are managed as cost centres. Maintenance managers are held accountable for their cost accounts and budgets, but they are not, as a rule, held accountable for the generation of revenue. The reason? It is difficult for the final consumer of the goods or services to perceive any attractive, interesting, and price-elevating difference created through maintenance, regardless of the quality of maintenance. A cynic might even take the view that value creation through maintenance is a contradiction in terms. It's more correct to say that maintenance (EAM) sustains or generates value that is being created in other ways.

Down-sizing has become a popular element within company strategies. The idea behind it is not just to make an organisation smaller, but to cut out activities that do not add much value, cannot be managed in a sustainable way or provide a competitive advantage in the value-add processes of a company. Current business wisdom holds that managers should concentrate their resources on activities that they do better than their rivals.

Many maintenance skills are not proprietary or rare at all, and easy to imitate. Even when a maintenance capability is executed secretly and is difficult for a competitor to imitate, resignations can nullify the company's advantage. Buying assets that are inherently more reliable or less costly to replace than it is to maintain is, in principle, a solution for difficult, time consuming, and expensive maintenance. Thus in many cases maintenance is not considered a source of sustainable competitive advantage, regardless of how crucial or value adding it is. This and a drive to downsize a company makes a good argument to outsource maintenance.

3.5 CONCLUSION

The traditional life cycle phases of an asset is: plan, acquire, install, operate, maintain and dispose. Enterprise asset management or EAM is the discipline of improving the ROI and ROA of capital-intensive assets through their effective and efficient management within all these phases. Studies have shown that with effective and efficient management the total cost of ownership can be reduced by as much as 35%. Companies seldom have the opportunity to apply asset management in the plan, acquire, install and dispose phases. Due to this EAM has become associated with the maintenance life cycle of assets.

A sound maintenance program is absolutely necessary for the overall, long-term company survival and profitability. Maintenance however will always be treated as a cost centre because it is difficult for the final consumer of the goods or services to perceive any attractive, interesting, and price-elevating difference created through maintenance, regardless of its quality. It's more correct to say that maintenance (EAM) sustains or generates value that is being created in other ways or other areas.