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Measuring Asset Performance, Part 1

Accountability requires we measure our performance – but what? And how? Judging from the number of inquiries, many asset managers are now asking these questions. This is the first part in a three part series that will look at measuring asset performance.

Part 1: The Principles

What are others doing?

A short term, quick-fix, solution is often sought by copying what others are doing. But be aware that

- (a) others may not be doing it “right”, and
- (b) what is right for them may not be right for you.

So how can you tell whether ‘they’ are doing it right, and whether their solutions are the right solutions for you? This is where it pays to know the principles that underlie the construction of performance indicators. This is not a textbook, so I have simplified the principles down to what I consider “the basic three”. Then I look at how to translate these principles into action and at a number of performance indicators currently in use. The aim is not to copy what others are doing but to analyse, assess, and then adapt the best.

Why measure?

We pay lip service to asset measurement when we simply record anything that is easily recordable – and fail to do anything significant with the data we collect. So...

*Researched and written by Dr Penny Burns, AMQ International.
Published fortnightly. Subscription, Comment, or Inquiries to*

AMQ International
PO Box 75 Salisbury South Australia
Tel 618 8258 4342 Fax 618 8281 5795
Email: sam@amqi.com

Principle 1.
Know what action you wish to take as a result of the performance you measure.

Before attempting to measure performance, it is necessary to be clear what the objective is.

The objective may be

- to measure the need and scope for improvement when developing business or service plans; or
- to measure the achievement of aims, policies, plans and budgets.

Asset performance data will support *tactical management reporting* over fixed time periods of variable length and *strategic reporting* when assessing future service delivery.

The overall purpose of performance measurement is to:

- Focus on improvements in value for money (VFM)
- Trigger management action
- Identify successes and problem areas
- Enable management learning
- Support strategic management

Check! Look at your current performance measures. Can you tell which of these objectives is being pursued? Are you able to say *precisely* how your measure achieves the objective. If not, then ask yourself what the measures ARE doing (other than the obvious of complying with a requirement to 'measure').

Management ratios and targets

A method of measuring and evaluating performance is to set up management ratios which measure against set targets and objectives. They provide the means by which achievement of business plans is measured and can be used for comparing relative

performance for the purposes of management control and for forecasting future resource requirements.

Different management ratios apply at different levels, from corporate to department to individual service unit. Correctly designed, each level of performance outcomes feeds into the level above.

Corporate

- Overarching objectives
- Trends (in relation to the implementation of the strategic plan)
- Special priorities and exceptions
- Asset management strategy
- Quality of all services provided



Service Group/Committee

- Service delivery
- Service trends
- Service priorities, exceptions, needs and requirements
- Management of allocated resources and budgets
- Service quality



Individual Service Units

- Management of resources
- Customer/client satisfaction

You are different

Every agency may have different corporate objectives – and priorities within those objectives – so the performance that needs to be measured will vary with agency.

Devolved structures and greater delegation of responsibility and control require adequate standards of reporting and control within the management structure of individual departments and the agency as a whole. As ever, it is important to establish who is to be accountable for what, to whom and how. Which brings us to Principle 2.

Principle 2: Assign accountabilities.

Know

- (1) who is to be responsible for collecting data,
- (2) who should be analysing it (and for what purpose) and
- (3) to whom the results should be reported.

Check! Unless the person to whom the results are to be reported has both the ability to act on the data and a willingness to do so, the whole exercise is a fruitless paper chase. If the results being reported do not have a direct bearing on the performance of this officer, *re-think!*

Look again at “overall purpose” box on page 90. What objective is being addressed by the results presented. Are they in the correct form for action? For examples, is information that is designed to “trigger action” presented in such a way that the action points are flagged?

Principle 3. Avoid Excess

The danger in any management information system is excess data. A few items of key data are more likely to encourage and enable effective manage-

ment, than too much.

Bruce James, GM Transfield Maintenance, writing in 1996: “We measure success by first understanding the drivers which determine the client’s success. It is most important that any measures put in place for the contract achieve some benefit and are not just ‘nice to have’. ... This is not a job creation scheme for a junior clerk or engineer and particularly, it is not the job of an entire team of people. The systems put in place should be developed so that the required information is output on a monthly basis without more than a few man days of effort” Bruce’s suggestions for such tactical measures are in Issue 10, July 1996 of the newsletter as cited in the reference list over the page.

Performance can be measured at many levels. We can look at input ratios, activities, and outcomes. However, if any analysis of input ratios does not lend itself to changing the nature of activities, and if an analysis of activities does not have any bearing on outcomes, again we are wasting our time.

Performance Indicator Information on the Web

These indicators are at the service delivery level, not the asset level. But since asset performance indicators should throw light on corporate service delivery performance, this is a good place to start.

Local Government Performance Indicators.

You can get performance indicators for many UK and USA councils on the web by looking up “performance indicators”. For example, Ashford Borough Council www.ashford.gov.uk/pages/coun11.htm provides a series of indicators covering such things as control over development, dealing with the public, refuse collection and the local environment, provision of housing accommodation, payment of housing benefits, housing the homeless, sports and leisure.

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Wolverhampton Council www.wolverhampton.gov.uk/perfind/index/htm includes waste disposal, roads and streetlights and libraries in its collection of performance indicators. Details of a wide range of performance indicators for local government can be got from the Audit Commission's Performance Indicators 1997/98 www.lbhf.gov.uk/Have_your_say/Pls9798/K.htm

But performance indicators are not limited to councils. For example, you can get performance measures on North American major freight railroads on a fortnightly basis from www.aaa.org/aathome.nsf And there are performance indicators for health and housing.

You can access these sites easily through the resources section in www.amqi.com - just look up "performance indicators"

In the next issue:

How to translate Performance Measurement Principles into Action

Examples of Asset Performance Indicators wanted

In the next several issues of the newsletter I will be including practical examples of asset performance indicators. If you have any that work for you, I would love to see them. Please send them to me at Infor@amqi.com

Penny

Other SAM references that you may find relevant to this topic

1999, p.114 "Designing Performance Indicators" - how to make your measures "operational"

1999, p121-123 "Ageing Buildings" – risk and performance measurement to extend the life of ageing buildings and priorities action in your portfolio, by David Ness, of DAIS in South Australia.

1999, p135-136 "Are we ready for performance based contracting" – issues from the web dialogue on performance based contracting.

1998, Vol 2. Issue 4, p.16-17 "Tools of the Trade" - a brief description of a tool developed by Warren Corlett to assess executive officer performance in asset management. Further detail available.

1998, Vol 2, Issue 6, p4-5, "Benchmarking Asset Performance in Victorian Public Hospitals" an analytical review of a CII (Construction Industry Institute) Report.

1997, Vol 1, Issue 1, p. 5 "Do you know which of your asset's characteristics are essential for your customers?" The second part of Sigrid Pfaffe's detailed explanation of demand gap analysis. (First part was in 1996, Issue 11 (October) pp 19-21)

1997, Vol 1, Issue 6, p.9 "Asset management performance determines asset performance" A simple checklist of not-so-simple questions from the Australian Community Health Service.

1996, Issue 10, July, p.15 "Outsourcing – measuring success" A collection of performance measures used by Transfield Maintenance grouped into "Effectiveness", "Efficiency", "Flexibility" and "Safety/Environment".

1996, issue 8, January p.17 – 19. " Ideas in performance measurement" including knowing when to act on performance data, how often you should measure, and what detail is required.

Depreciation Models— And How to Choose Between Them

The choice of depreciation approach, like the choice of valuation, depends on what purpose it is to serve (eg accounting cost amortisation or information for management decision making).

For asset managers, the natural choice is the depreciation and valuation approach that provides management with incentives towards a safe, reliable, efficient and productive asset service and avoids any incentives that would produce the reverse. Given this overriding objective, the secondary objectives are that the method chosen should be simple to operate, transparent, and cost effective.

What Options do you have?

There are **three basic methods** and a number of sub-variations for approaching asset depreciation that may be used for infrastructure assets. Different methods may be chosen for different asset groups. It may also be appropriate to change the depreciation approach when the nature of the asset, and its service, changes.

This means that the choice of option is determined by:

- Nature of the asset and the information known about it;
- Management intentions for the asset

1

Traditional formula based approaches.

Generally based on the age of the asset, the expected life of the asset and the replacement cost. The “straight line” depreciation formula is the most common of the formula approaches but “declining balance” and “increasing balance” approaches also fall within this category.

Straight Line, etc based on age and expected life, are appropriate where:

- Age and life are known with some certainty
- The asset is replaced as a whole, rather than re-

newed piecemeal; and

- No corrective action is taken during the life of the asset, which would offset some of the accrued depreciation.

There are two very interesting variants of the formula approach which deserve consideration:

Measured condition - where the using up of service delivery is expressed in terms of capacity usage rather than elapsed time. This is more common in manufacturing than it is for infrastructure but does have infrastructure applications. For example, it is possible to measure the condition of rail track by the surface area. As successive grinding takes place the surface area wears. This can be measured reasonably accurately and is a good guide to the remaining service potential.

Constant condition - where an asset portfolio or network has remained constant long enough for its individual components to have experienced a number of renewal periods, the portfolio will tend to a situation where the components are evenly distributed over the age spectrum. This is known as the “golden mean” and is characterised by having annual renewal equal to annual loss of service *potential*. *In this case the overall average condition of the network remains constant.* The average age of the assets – evenly distributed across the age spectrum – is 50%. So the asset value is 50% of replacement cost and net depreciation is zero.

2 Decay models.

These models use measured or observed conditions to develop a standard pattern of deterioration for the asset. The condition of any individual asset is then matched against the standard pattern to determine the extent of residual life. This residual life, expressed as a percentage of the total expected life, yields the depreciated value.

Decay Models are used where:

- Age of asset is not known and needs to be approximated by condition.
- The general pattern of decay is known but precise time at which assets arrive at each point on the decay curve is influenced by more factors than simply age (or where age is simply not known and needs to be estimated by observed condition); and
- No corrective action is taken (corrective action would result in increases in the depreciated value and decay models, like traditional formula approaches are only able to cope with monotonic declining depreciated values);
- Condition can be measured or observed.

Decay models are used with traditional formula approaches to determine depreciation, with expected life to determine a condition proxy for age and thus residual life.

3. Condition based depreciation (CBD) models.

These models estimate the value of an asset as the cost of 'as new' replacement less the cost of re-establishing the existing asset to 'as new' condition. Costs of renewal are estimated over a finite future period (generally about 20 years) and are discounted. The NPV of renewal costs over the planning period is then divided by the length of the planning period to determine an annuity which is used for depreciation—representing the average annual cost of 'undoing' the used up service potential. Thus this method is often called the Condition Based Annuity Method.

CBD models are used where;

- Age is not a useful predictor of value because of periodic renewal intervention;
- Future renewal costs are dependent on either renewal choices; and
- Future renewal timing is dependent on earlier renewal choices.

CBD is best used where an asset consists of many interlinked components each with different lives but all of them dependent on the behaviour of each other for their own renewal periods ('economic lives').

Limitations and watch-points with the three depreciation models

Each depreciation model has its advantages and is applicable in certain situations, each of the models also has its limitations.

- **Traditional formula approaches Based on Assumed Economic Life and Estimates of Age.**

These critically depend on getting age and economic life "right". If an asset is 20 years old and has an expected total life of 30 years, it will be valued at one third or 33% of a new asset. If, however, its real economic life is 40 years, that same asset will be only half way through its life and its value would be 50%.

The older the asset, the greater the impact from getting the 'economic life' estimate wrong.

- **Decay Models**

Probability and conditional probability. It is a mistake to estimate residual life by taking the known age from the expected economic life. The decay model should use measured or observed conditions to determine where the asset is on its decay curve. A particular asset may take 10 years to get to the standard 5 year mark and another may arrive at the standard 20 year mark in only 15 years.

Horizontal or vertical sections. If the decay curve has large sections which are horizontal or vertical it does not yield a one-to-one relationship between condition and predicted residual life and has limited (if any) use in determining residual life.

It is then better to use formula depreciation (eg Straight line depreciation) unless the condition of the asset is subject to intervention which increases the value, in which case it is better to use CBD.

▪ **Condition Based Depreciation**

Only where an asset experiences no intervention to restore lost value is it true to say that the older the asset, the more of its service has expired. Assets which are subject to continuous but piecemeal renewal, need a depreciation methodology that takes into account BOTH the gradual using up of service potential AND the ongoing renewal of this potential. This is what the Condition Based Depreciation (or Condition Based Annuity) Approach does, using projected, optimised, renewal programs in an asset management plan.

Don't use CBD when you are assuming a definite economic life (CBD works on an indefinite life basis).

Don't use CBD when you do not have an asset management plan to justify your renewal projections.

Valuation when using CBD is Replacement Cost of an "as new" asset LESS the cost of restoring the asset to full value (discounting future costs over the planning period).

Depreciation Patterns for Individual Assets and for Asset Classes

An individual asset will exhibit a declining value pattern but the class of those assets could exhibit a constant value!

Depreciation for an asset class is the sum of depreciation of its constituent assets. If each asset is correctly represented by a Straight Line Depreciation (SLD) approach then the depreciated value of the class as a whole will depend on the average remaining life of the asset constituents. If an asset class remains constant long enough, its replacement will tend to a 'golden mean' where the average amount of wearing out is actually replaced each year. When the asset class gets to this stage then the asset value is constant.

In practice, this would be approximated when the asset class has remained constant in size for about twice its economic life. Few organisations can claim to have this level of constancy over all. However, some sections of the asset stock may have this level of constancy. Where this applies the depreciated value pattern for an individual asset would be a declining one, but the pattern for the class as a whole be horizontal (at 50% of value). This is likely to apply to most population of timber sleepers and ballast.

And just for fun, an 'oldie but a goodie'

Gut-Wrenching

An apprentice popped into an Off the Job Skills Training Centre the other day and asked the tool supplier for a spanner.

"What sort of spanner—metric, Whitworth, BSF, socket spanner, ring spanner, tension wrench, open-ender, shifting spanner?"

Responded the apprentice: "Just a big bastard. I'm going to use it as a hammer anyway."

Coming next in Issue 39

- If 2% is the Answer, then what's the Question? (Maintenance Expenditure and Asset Value)
- Measuring Asset Performance, Part 2: Translating the Principles into Action (with examples)
 - Another story from the Troubleshooter's Casebook

Visit to the Wagga Wagga City Council

When I am on the move, I try to visit as many of my subscribers as I can and it was my pleasure to visit Alan Pottie, John Craig and the asset management team at Wagga Wagga City Council in New South Wales last week. They are consolidating their asset management information and looking to how to present the messages that it is giving them. Moving from technical asset information to outcome measures that are meaningful for elected members is the aim. In order to encourage greater interest on the part of councillors in the road renewal program, they are producing their asset management renewal program in the form of city maps, colour coded for the action recommended. We talked about methods of communication and, as this seems to be an issue of general interest to councils and others, we will be collating some good communication practices for a later issue of the newsletter.

All councils, but rural councils in particular, look to ways in which they can promote economic development. This is a valuable role for council but if it requires the provision of long term assets where the future demand is doubtful, asset managers may need to move outside their own sphere of asset knowledge and take on board issues such as technological change, market development, current and future competition, etc. This was another issue that we discussed and my recommendation to Wagga Wagga was that they seriously consider getting an external value management study done. This enables a broader view to be taken and avoids the danger of continuing to invest in an asset simply because it exists and has done good work in the past. The future is what counts.

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