Pacific Power Association
& Asian Development Bank

Manual of Performance Benchmarking

July 2002

For Pacific Power Utilities

Foreword

Pacific Power Utilities Performance Benchmarking Manual

It is my pleasure to introduce this Manual of performance benchmarking for Pacific Power Utilities.

The Manual is provided as part of a program of performance benchmarking for Pacific power utilities funded by the Asian Development Bank and co-ordinated through the Pacific Power Association.

The objective of this program is to improve the performance of electric power services throughout the Pacific through establishment of benchmark criteria and formulation of action plans to achieve improvement.

The benchmarking program has been developed over the past several years and has involved:

1) Development of performance questionnaires, surveys and data base;
2) Conduct of a workshop for validating and reviewing data and formulating proposed action plans for participating utilities;
3) Circulation of benchmark results and opportunities for improvement.

In future a regular cycle of benchmarking will be established in conjunction with the conference program of the Pacific Power Association. It is envisaged that this will involve regular documenting and monitoring of progress to ensure on-going gains are realised.

This Manual is designed to assist Pacific power utilities to effectively participate in the program by explaining benchmarking techniques, providing some ready reference benchmarks and how to “drill down” into opportunity areas to achieve further gains.

I commend this Manual to you.

Tony Neil
Executive Director
Pacific Power Association

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A: Pacific Island Power Utilities
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I INTRODUCTION

A Purpose

To provide easy-to-follow guidelines for benchmarking

The purpose of this Manual is to provide easy-to-follow guidelines for use of benchmarking in Pacific power utilities.

The Pacific Power Association (PPA) and the Asian Development Bank (ADB) have initiated co-ordinated benchmarking for Pacific power utilities by facilitating the conduct of a first round of benchmarking. Year 2000 and 2001 data was collected by questionnaire, compared and analysed, discussed at a Workshop of participants conducted in Fiji in October 2001 and the results issued shortly thereafter in a progress report. A review of this data and results is being conducted, additional utilities are being included, and a further report will be issued in 2002.

This Manual provides easy-to-follow guidelines upon how Pacific power utilities can continue with benchmarking to obtain maximum on-going benefits.

B Philosophy

Use practical examples suitable for the Pacific

The philosophy of this Manual is to provide a practical guide to performance benchmarking, with worked examples, using current data.

C Methodology

Tailored from Pacific workshops

Methodology for compiling this Manual has been to:
1) Identify the principles of benchmarking;
2) Apply these principles to the Pacific;
3) Develop application methodologies from experience gained from the inaugural Pacific power utilities' benchmarking program conducted in 2001 and 2002.

D Structure

This following Manual is structured as follows:

- What is benchmarking?
- Why benchmark?
- When to benchmark;
- How to benchmark;
- Lessons so far;
- Future directions;
- Appendices.

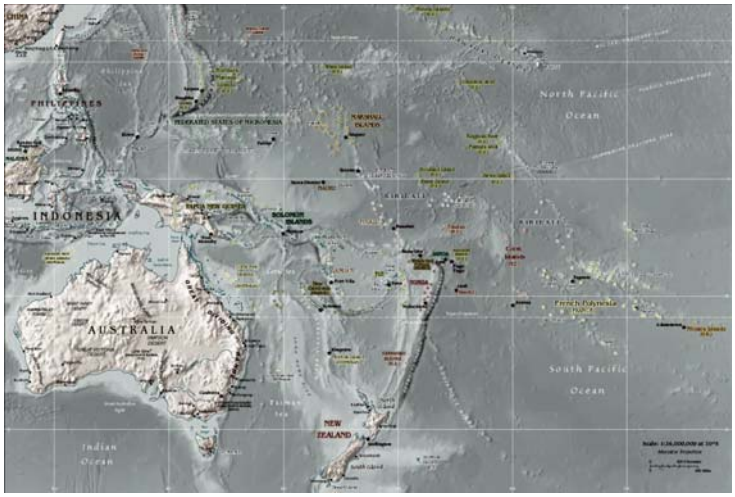
II PACIFIC ISLAND POWER UTILITIES

This benchmarking Manual has been designed specifically for use by Pacific Island power utilities.

Not all these utilities have participated to-date in Pacific benchmarking – utilities representing about two thirds of installed capacity have already joined. However, all power utilities are invited to participate and in this way extend the comprehensiveness and therefore the quality of benchmarking data for the benefit of all.

By way of background, the Pacific Ocean is 166 million square kilometres and occupies about one third of the globe.

Overview of the Pacific



It includes an extensive number of islands, which can be grouped as follows:

Islands of the Pacific

1) Polynesia, made up of French Polynesia, the Cook Islands, Western Samoa, America Samoa and Tonga;
2) Melanesia, consisting of Fiji, New Caledonia, Vanuatu, the Solomon Islands and Papua New Guinea;
3) Micronesia consisting of Guam, the Northern Marianas, Palau, the Federated States of Micronesia (Yap, Truk and Ponape) and the Marshall Islands.

The utilities servicing these islands are listed at **Appendix A** (which includes general operating characteristics for utilities participating in the current round of benchmarking)

The majority, but not all, of power utilities servicing these islands are in public ownership. In some cases where public ownership is retained, there is sub-contracting and leasing of operation of facilities to private enterprise.

Electricity selling prices tend to be high, typically around 16 cents USD per KWh, because of usually heavy reliance upon expensive diesel generation and remoteness

from suppliers. Often these utilities receive grant assistance. Generation is generally small, compared to mainland utilities, with installed capacity being typically 100 MW or less and customers served around 10,000; but of course there are substantial variations from these typical figures. Overall, there appears to be opportunities to improve effectiveness and efficiencies and overall commercial performance of these power utilities.

Use of benchmarking is a major opportunity to promote such efficiencies and effectiveness because it is a natural way to learn from better performers. Furthermore, it is a major policy instrument which is available, where others may not be. For instance, benchmarking can serve as a useful surrogate to competition which is a major improvement driver in bigger mainland economies. But competition is not likely to be viable alternative in small island economies because the diseconomies of breaking up the electricity value chain will almost certainly outweigh the benefits of limited, if any, competition which is likely to emerge in such small economies.

It is with this background in mind that this Manual on Benchmarking is commended for Island reading with a view towards implementation.

III WHAT IS BENCHMARKING?

A Definition

Benchmarking is:
- **Systematic**
- **Comparative**
- **Focussed on best-practice**
- **About improving**

Benchmarking is the systematic comparison and evaluation of businesses, either totally or at an individual functional level, to identify differences in performance and therefore opportunities for either breakthrough or continuous improvement towards best practice.

The key elements of this definition are as follows. Benchmarking is:
1) Systematic – it needs be part of an on-going disciplined program in order to achieve best results;
2) Comparative – involves evaluating relative performance;
3) Focussed on best practice – looks towards examples set by best performers;
4) About achieving quantum breakthrough or incremental continuous improvements.

B Two Main Types of Benchmarking

Methodologies for benchmarking fall generally into two groups:
1) Statistical; or
2) Management

benchmarking.

These two main types of benchmarking are briefly discussed below.

C Statistical Benchmarking

Uses sophisticated techniques, typically applied by Regulators

Statistical benchmarking focuses upon statistical relationships between the totality of resources consumed and outputs delivered; eg labour, materials etc consumed and KWh of electricity distributed over so many kms as outputs. Statistical techniques used are data envelope, stochastic frontiers (regression) and total factor productivity analysis. This form of benchmarking is partly favoured by regulators because it is comprehensive (i.e. includes a broad range of input and output factors) and facilitates prescription of best practice results to other utilities; i.e. for regulating prices and service levels. The problem is that the statistical outcomes produced can become very academic and difficult to explain (and understand) with the result that regulators also tend to rely upon management benchmarking as well.

D Management Benchmarking

Uses comparisons of
- **key performance indicators and**
- **performance indicators**

Management benchmarking involves use of comparisons, including of key performance indicators (KPIs) and performance indicators (IPs), to measure differences in relative performance regarding both service levels and efficiencies of various power utility functions.

This form of management benchmarking is essentially operational and is much easier to understand and explain regarding causes and effects of differences in practices and performances.

Management benchmarking may be undertaken at two levels; ie:
1) Overview, in order to generally assess relative overall service levels and/or efficiency across all or most power utility functions. The current round of PPA-ADB Pacific utility benchmarking is of the "overview" type of benchmarking;
2) In detail at a process level, in order to specifically assess particularly service levels and/or efficiencies of individual processes.

Notwithstanding the merits of management (customer-focus) benchmarking, it does have its drawbacks. Its inherent weaknesses are that it can produce partial rather than more complete views as it can lead to focussing upon one KPI at a time.

This drawback can be at least partially if not substantially compensated for by use of:
1) Balanced scorecards;
2) Performance quadrants.

Balanced scorecards require that KPIs and PIs be considered as a balanced basket of measures and not be considered individually. Performance quadrants require costs and service levels to be considered together in order to identify benchmarked performance. Both balanced scorecards and performance quadrants are discussed in more detail in **Section VI "How to Benchmark".**

Also, management benchmarking can be conducted internally and/or externally; i.e.:
1) Internally from one period to another;
2) Externally, either comprehensively between organizations (typically in the power or related industries) or between individual functions perhaps (by comparing similar functions in different industries).

E Focus of this Manual – Management Benchmarking

Our focus:

Management benchmarking

The focus of this Manual is on management benchmarking as a practical way of achieving self-improvement in the performance of Pacific power utilities.

IV WHY BENCHMARK

It is a:
- **Practical &**
- **Persuasive**

way to achieve improvement.

It helps drive improvement, for example, when competition is not practicable

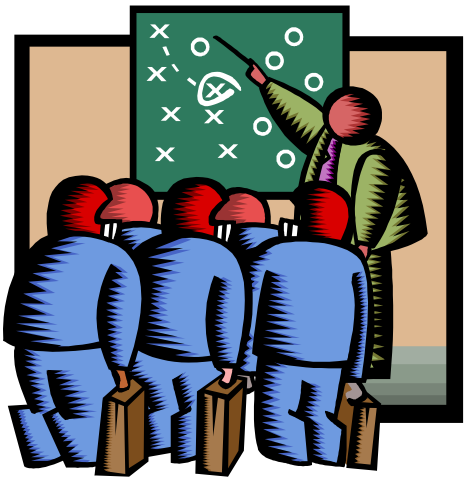
There are good reasons why Pacific power utilities need to benchmark.

Benchmarking is a powerful management and operational tool because:
1) Demonstrating better performance by way of actual working examples is very persuasive;
2) It allows managers and operators at the workface to discover and report on the facts themselves thereby facilitating self-improvement rather than having edicts (to perform better) imposed upon them "from above" – the former being much more motivational than the latter.

Also, it offers an alternative to and a substantial amount of benefits of competition. Internationally, to greater or lesser extent, competition in power is being used to promote better and best practices. However, in the Pacific, this option is unlikely to be available, because the diseconomies of disaggregating the power value chain, particularly because of replication of overheads, will almost certainly outweigh the benefits of the only very limited, if any, competition which could be generated in such typically small economies.

Benchmarking is best used as a planning rather than as a retrospective tool because the future can be changed whereas the past is immutable. Benchmarking can be used as a planning tool in conjunction with planning balanced scorecards whereby corporate plan targets, expressed in the form of scorecards, are benchmarked against best practice and then plans are changed and improved until reconciled with that best practice.

Long- term benefits of benchmarking include:
1) Increased levels of effectiveness (ie producing required outputs and achieved expected outcomes);
2) Increased levels of efficiency;
3) More empowerment of employees, particularly when benchmarking is extended to analysis and improvement by teams of employees;
4) Promotion of the "learning organization" whereby staff are taught to manage core competencies in a disciplined way and then can adapt, adopt and innovate in their own rights.



The limitation of benchmarking is that you are essentially “playing catch-up” (ie with better performers). So it is important that staff are empowered to look for breakthrough and continuous improvement, i.e., beyond currently identified best practice.

V WHEN TO BENCHMARK

- **Start now at overview level**
- **Join in with other utilities in the Pacific**
- **Then do detailed benchmarking on priority basis (i.e. most important things first)**
- **Complete a cycle of benchmarking**
- **Then decide to continue or use other improvement tools**

For every organization, benchmarking at one time or another is important.

For Pacific power utilities, it is important to continue now with benchmarking in order to capitalise upon the potential gains already identified in the first round of benchmarking and to sustain further on-going improvements in coming years.

Already benchmarking has shown potential gains available particularly in improving operating efficiencies, reducing line losses and enhancing commercial performance.

Such improvements will help meet Increasing expectations from customers, owners and regulators for better power utility performance especially in terms of better prices, services, safety and environmental outcomes.

It is probably best to commence with overview benchmarking (as presently conducted through the PPA) but then to progress along the lines of detailed benchmarking, possibly on a process-by-process basis in priority order (i.e. start where potential gains are greatest) over a number of years.

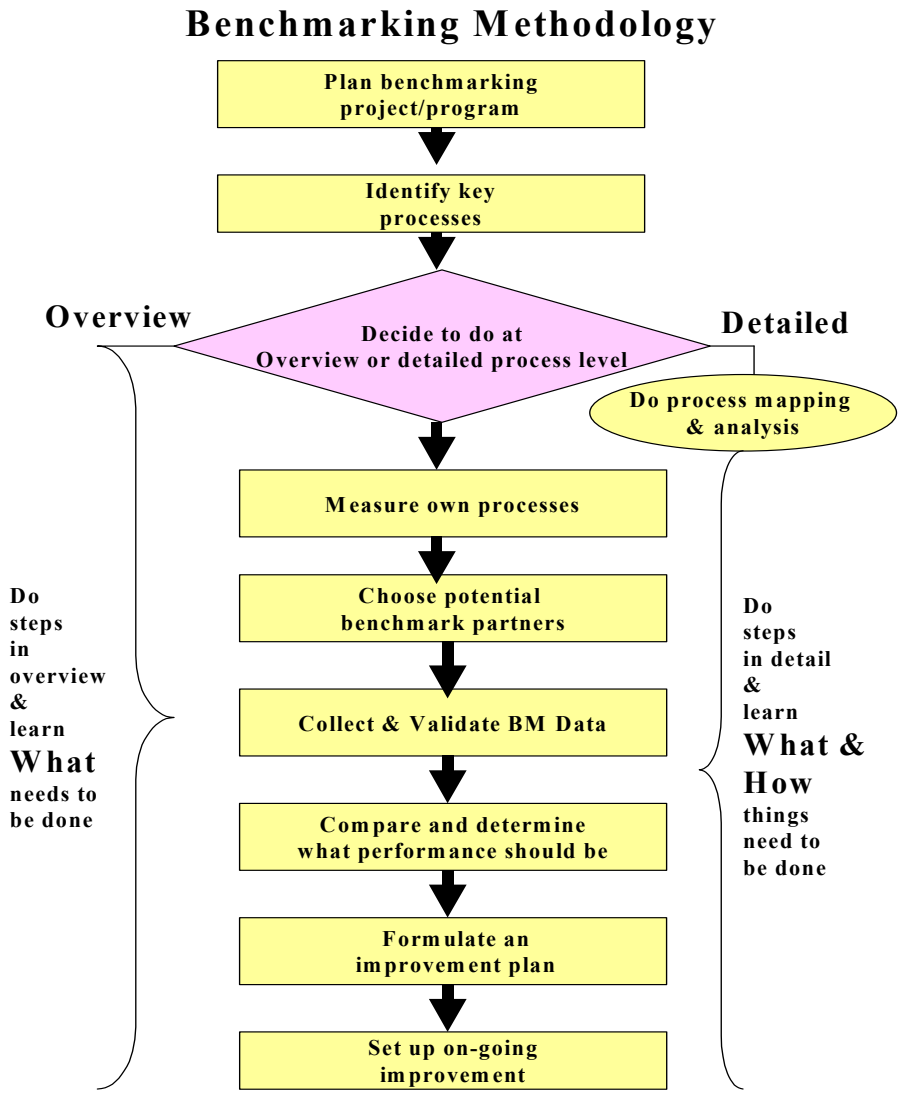
Once you have done benchmarking of all major functions you can then determine if there is a good return from investing more of your time and money in another cycle of benchmarking or whether another strategy is more appropriate towards achieving future organisational goals.

VI HOW TO BENCHMARK

A Introduction

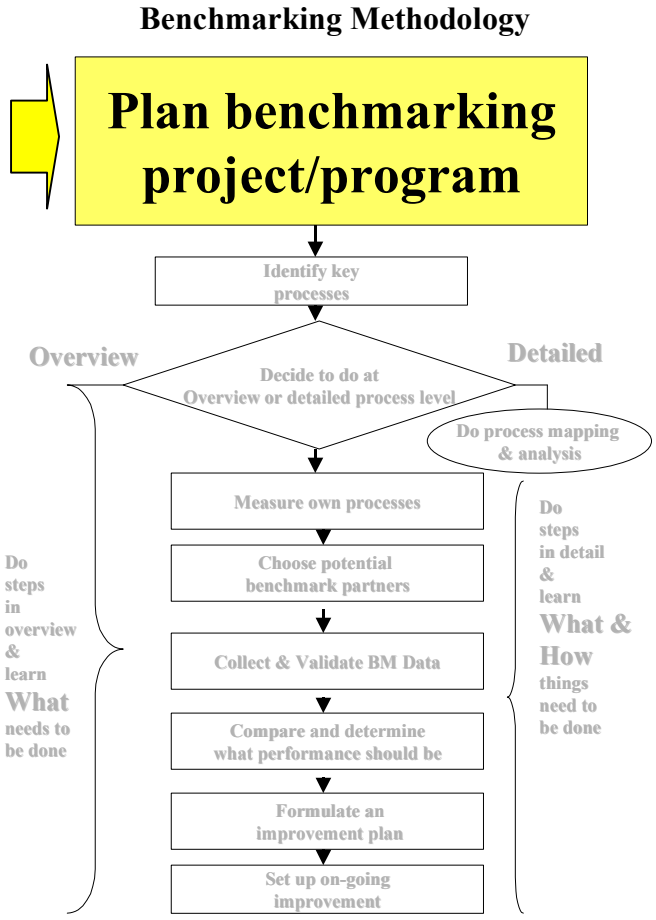
Benchmarking is an intuitively simple process; i.e. most people who attempt it would naturally end up doing similar things. The purpose of this Manual is to make available the benefits of experience to help streamline the readers approach and hopefully to gain some uniformity to facilitate effective benchmarking across Pacific power utilities.

The following graphic provides an overview illustration of the benchmarking process.



Each of these steps is expanded upon below.

B Plan Benchmarking Project/Program



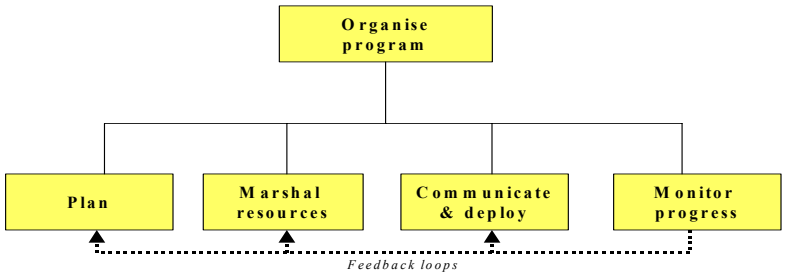
Plan your approach.

Consider applying the following techniques in your benchmarking approach:

1) **Identify customer requirements;**
2) **Include in your your planning cycle the use of benchmarks & balanced scorecards**
3) **Use performance quadrants**

You need to formulate a project and resourcing plan in consultation with staff and managers, explaining objectives and empowering them with authorities and accountabilities to participate. Marshall resources, build support, deploy and monitor progress. See the following illustration outlining benchmark project management.

Identify Benchmarking Project/Program



Identify your required approach.
In planning your benchmarking project/program, it is advocated that you consider use of the following approaches/techniques:

1) Identify requirements of customers in order to focus benchmarking on what customers want;
2) Use balanced scorecards to ensure other important stakeholders and aspects are considered;
3) Use performance quadrants to ensure that you concurrently consider both service levels and efficiencies.

Identify What Customers Want

Identify customer requirements either by using local knowledge (say in workshop sessions with staff and or customers, or preferably undertaking a customer survey). Knowing customer requirements will help you prioritise what is important for benchmarking. Following is a table of common customer priorities for electricity services, which of course will need to be tailored to the requirements of your island residents.

What Electricity Customers Typically Want

What Customers Typically Rank as Important **(In descending order from most to less importance)**	**Typically how measured**	
	KPIs *(examples)*	**Survey**
Reliability of supply	SAIDI, SAIFI	Survey Results
Price	Price comparisons	
Clear cost/pricing structures	Compare structures	
Bill clarity	Compare formats	
24 hour customer service; ease of contact	Compare service standards	
Good customer service	As above, compare service standards	
Accuracy of billing	Billing errors	
Individual treatment	% implementation of Customer relationship management (CRM)	
Price guarantees	Comparisons	

Please see **Appendix B** for notes on how to identify what customers want and then use this to help focus your benchmarking effort..

Identify What the Overall Business Needs

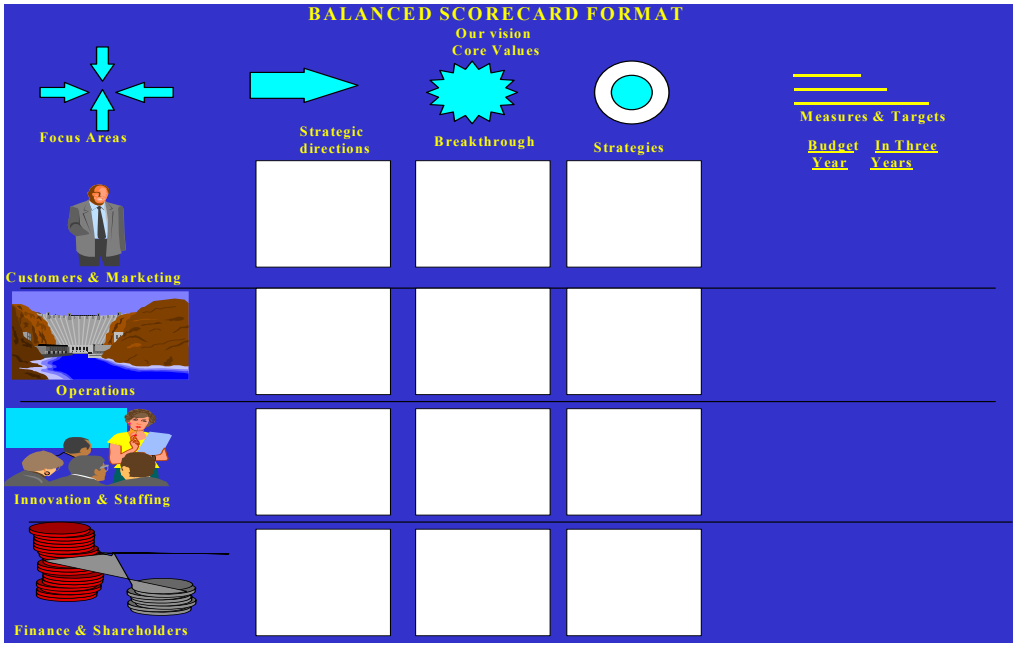
Use of balanced scorecards allows you to place in context customer and other important stakeholder requirements, particularly shareholders, staff and the community. This appropriate context facilitates taking a more comprehensive and wholestic approach to knowing what to focus on in benchmarking.

The four basic questions the balanced scorecard approach seeks to address and the type of things to be measured are summarised in the following table.

Contents of Balanced Scorecards

Four Basic Questions	Aspects to be Measured	Typical Measures
How does the customer see us?	Time, quality, service and cost/price	Customer satisfaction.
What must we excel at (i.e. what are our core competencies)?	Process measures of outputs, efficiencies, cycle times, defect rates.	SAIDI (System Average Interruption Duration Index) SAIFI (System Average Interruption Frequency Index) Plant availability Capacity factor
Can we continue to improve and create value?	Extent of innovation and improvement (which is highly reliant upon staff contributions)	% revenue from new products % savings achieved LTID (Lost time injury duration) LTIF (Lost time injury frequency) TLID (Total lost time dure to industrial disputation)
What do we look like to our shareholders?	Profitability, growth and shareholder value	Return on Equity

Ideally the balanced scorecard approach forces managers to focus on the handful of measures which are most critical and are mostly output or outcome indicators; i.e. mostly relating to results for key stakeholders (customers, staff, and shareholders) but with some important key operational indicators also included. Importantly, strategy and vision (and not control) are seen to be at the centre of successfully implementing balanced scorecards. Format of balanced (action plans) scorecards are as follows:



Use Benchmarking and Balanced Scorecards as Planning Tools.

Concentrate upon using benchmarking for planning; i.e. you can only change the future, the past is unchangeable. Use balanced scorecards to include planning targets benchmarked against best practice.

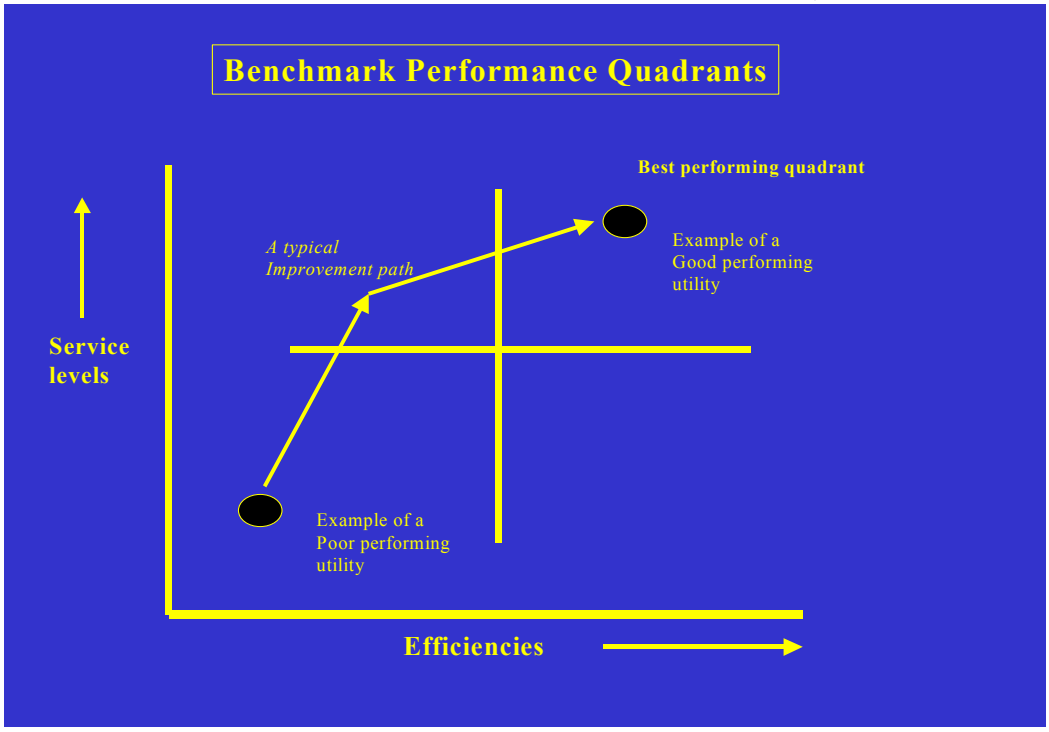
Use Performance Quadrants

Similarly with balanced scorecards, use of performance quadrants helps overcome potentially partial views only being considered in management benchmarking. In this case, use of performance quadrants forces concurrent consideration of service levels and unit costs. For example, what is the use of having extremely low unit costs (possibly reflecting efficiency) when service levels are low and customers are complaining. Performance quadrant analysis helps overcome this. When graphed, performance quadrants relate measures of relative efficiency along one axis and relative service levels along the other, with points of intersection falling into one of four performance quadrants:

1) Low efficiency, low service levels – (lower left) worst performance quadrant; or
2) High service levels, low efficiency - (higher left) high service priority quadrant; or
3) High efficiency, low service levels – (lower right) low cost priority quadrant; or
4) High efficiency and high service levels – (higher right) the best performance quadrant.

These trade-offs between service levels and efficiencies can relate to one service and related costs or a basket of products and services and related costs. See the following **Illustration**

Illustration
Service and Cost Trade-offs & Best Performance Quadrants



Calculations involved for the first round of Pacific power utility benchmarking using performance quadrants intentionally has been kept very simply so as to focus initially

upon data. Once a solid database has been established, then methodology can be extended to include more variables and more complex calculations.

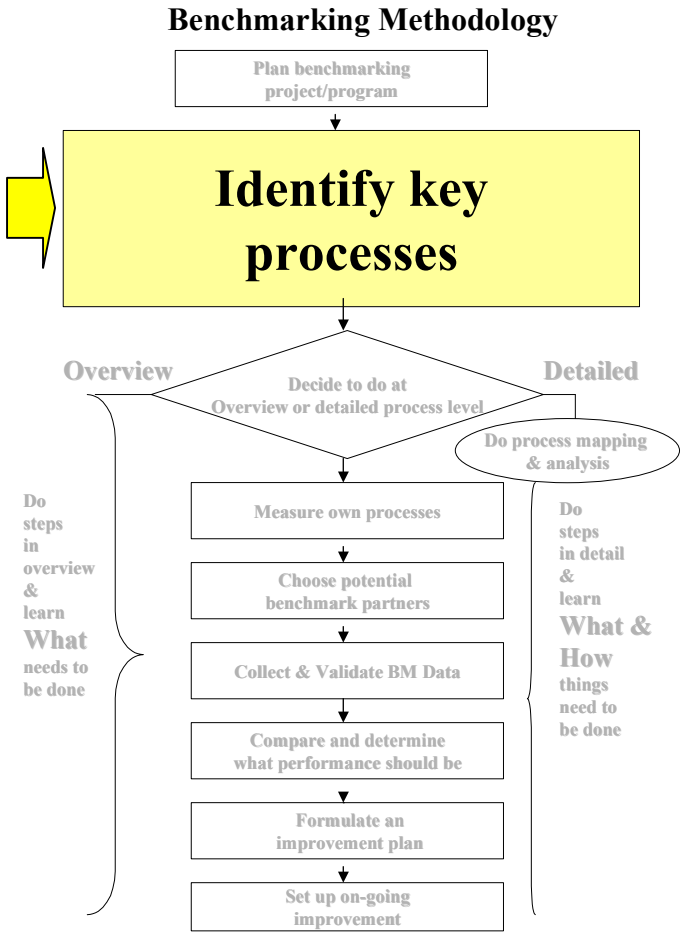
Performance quadrants so far undertaken for Pacific power utilities rank relative performance for each utility across generation and distribution functions as follows:

1) Generation;
   a) Service levels determined by availability of plant %; i.e. along the “y” axis;
   b) Efficiency determined by equally weighted average of capital efficiency % (capacity factor compared to best performer) + operating efficiency % (O&M costs/MWh compared to best performer); i.e. along the “X” axis;
   c) Relative position of each utility is plotted at the intersection of readings along both “Y” and “X” axis
2) Distribution:
   a) Service levels determined upon SAIDI % (compared to the best performer);i.e. along “Y” axis;
   b) Efficiency determined by 1:2 weighting of capital efficiency % (transformer utilisation ratio compared to the best performer) + operating efficiency % (O&M costs/km compared to the best performer); i.e. along the “X” axis;
   c) Relative position of each utility is plotted at the intersection of readings along both “Y” and “X” axes

As you can see, only relative performance is being judged and in this respect results can vary:

1) If additional utilities are included in the data base; eg from outside the Pacific; and
2) Over time as performance changes; for example, productivity might be expected to improve by at least 3% pa, and if any one utility remains stationary, then its relative efficiency will deteriorate over time.

C Identify Key Processes



Have regard to the power utility process map provided

Amend it to suit your utility

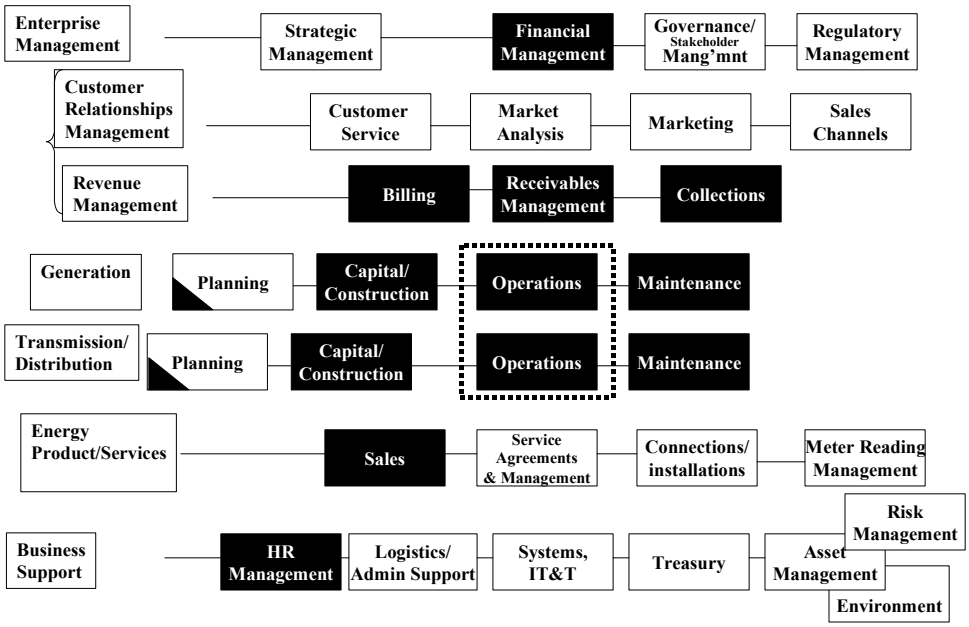
Choose which processes areas you wish to measure and benchmark

First, As a Foundation, Identify Key (Overview) Organisational Processes
First, identify your key processes by drawing an overview process map. This will provide the foundations for determining what to benchmark and will subsequently make evident what has been omitted from benchmarking. Knowing both is important for interpreting results.

Please see below an overview organisational process map adapted from a competitive, best practice, power utility. Notice also, that customer relationship management functions, typically associated with competitive markets, is retained here because customers like to be treated individually and at high customer care levels, whatever the type of market they are served in.

Model Process Overview Map

Key Power Utility Processes for Adaptation for the Pacific

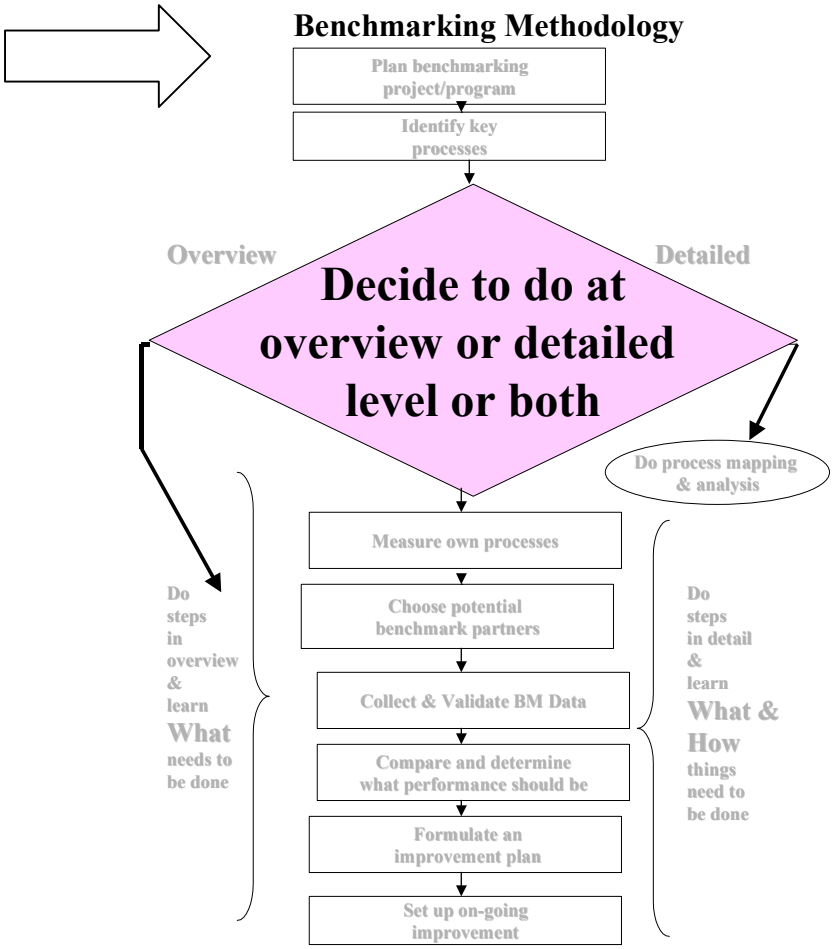


Note: darkened boxes indicate process areas covered so far in PPA overview benchmarking

After completing the overview process map, you will then have options of:

1) extending the current scope of benchmarking into other areas (for example, environmental management has not yet been included in Pacific utility benchmarking); and/or
2) drilling down into more detailed analysis of already benchmarked aspects.

D Decide Whether to Do Overview of Detailed Process Benchmarking



Start with overview benchmarking

Then do detailed benchmarking

Detailed benchmarking can be done:

1) **With a few selective processes (i.e. as flagged by overview benchmarking)**
2) **Cyclically including all processes over a number of years**
3) **All processes at the one time.**

Consider use of teams, particularly for detailed benchmarking.

Generally a utility would start with overview benchmarking and then proceed, possibly on a selective basis, with detailed benchmarking. The recent rounds of benchmarking involving Pacific Power Utilities are overview benchmarking. Overview benchmarking will tell you where problems exist and general magnitudes of improvement required; i.e. **what to do**. Detailed process benchmarking will tell you this but also provide the basis for cause and effect analysis and thereby how to resolve problems i.e. **what and how to do it.**

See **Appendix C** for indicative more detailed process maps for a power utility.

Detailed process benchmarking can consume time, energy and costs but for substantial and sustained improvements it can represent good value and a good investment. Each utility must determine for itself whether or not to do detailed process mapping and analysis in support of benchmarking

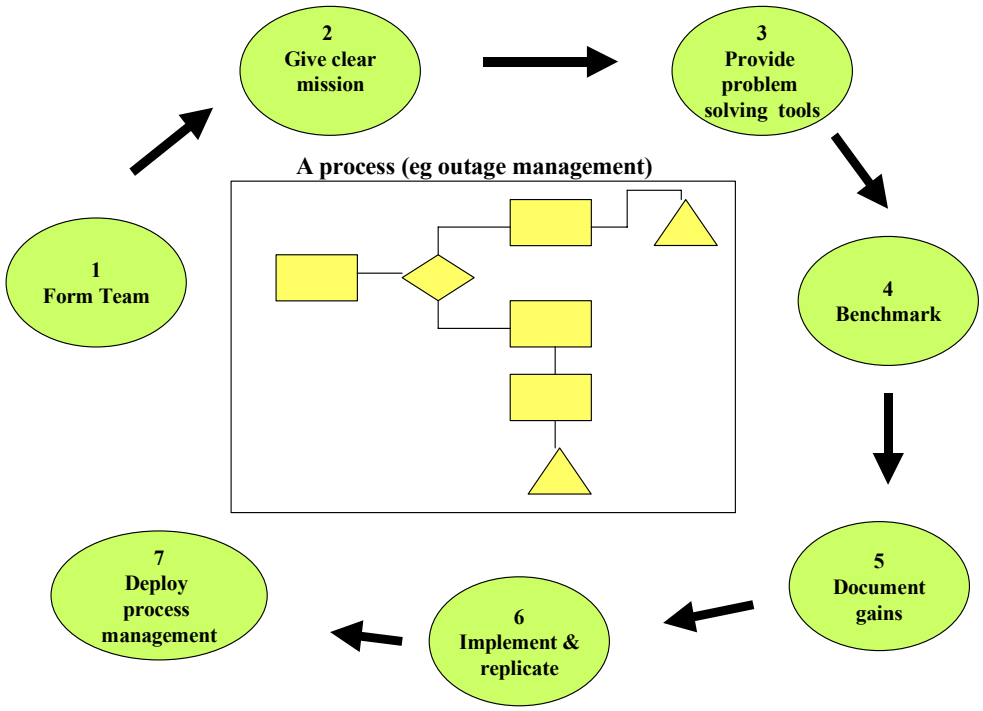
Consider Setting Up Improvement Teams

Once a utility decides to undertake detailed analysis and/or process mapping for benchmarking, it is both appropriate and effective to set up teams to address such aspects. For example, to improve system average interruption duration index (SAIDI) the following more detailed aspects will need to be analysed and (no doubt) strengthened:

1) Generation performance;
2) Distribution performance; eg:
   a) Planning (eg, in regard to construction standards);
   b) Operations (eg, in regard to practices regarding re-closing after trips);
   c) Maintenance (eg in regard to live-line working).

Typically no one unit within a utility would have all the staff skills to address the whole range of such contributing factors. So it then becomes appropriate to set a team (i.e., including representatives from generation and distribution) to address and hopefully solve the problem. An illustration of team arrangement is provided below.

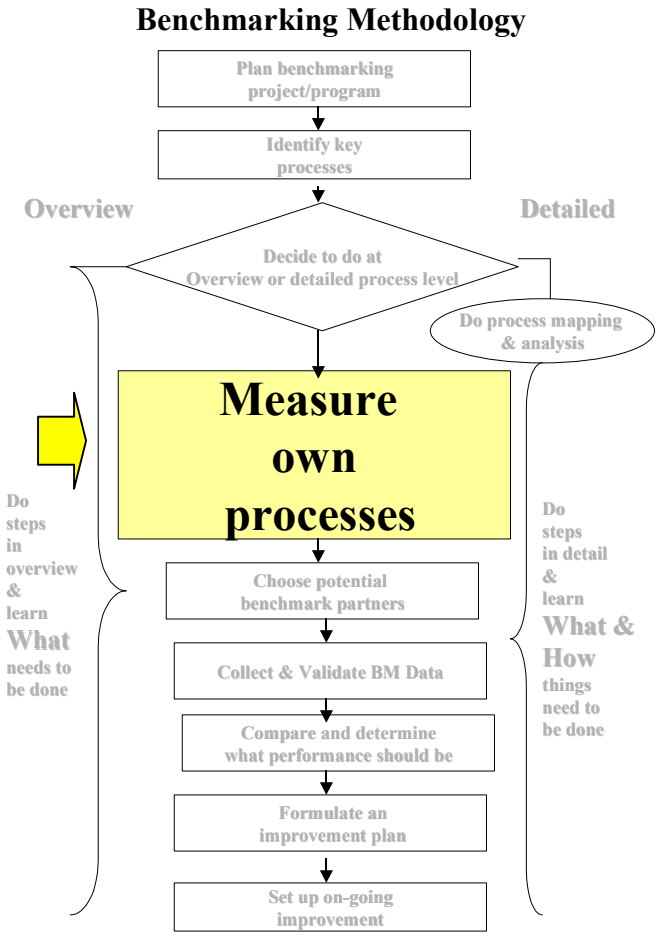
Improvement Team for Benchmarking



Guidelines for setting up improvement teams are:

1) Form the team;
2) Provide a clear mission;
3) Give the team problem solving tools (it is best if they can drill down to process levels – as depicted at the centre of the diagram – in order analyse and create improvements taking into account “cause and effect” relationships)
4) Undertake benchmarking
5) Quantify and document gains to be made;
6) Implement and replicate across other areas to be improved;
7) Allocate on-going improvement target paths to the various process managers involved.

E Measure (& Analyse) Own Processes



Measures can be qualitative; eg:
1) **Photographs;**
2) **Observational;**
3) **Assessments.**

Measures can be quantitative & of the following types:
1) **Effectiveness;**
2) **Efficiency;**
3) **Volume**

Analysis can be done using the "six tools of quality"

You need to identify what are the critical success factors for functions (overview or detailed) under review and to then decide which measures best reflect success for failure in performance.

It is important to be able to characterise measures, because this will influence the interpretation of results produced.

Types of measures for benchmarking purposes are:
1) Qualitative; and
2) Quantitative.

Qualitative measures, for example, can be:
   a) Image based; eg comparing photographs of different facilities;
   b) Observational; eg comparing clarity of different billing forms.

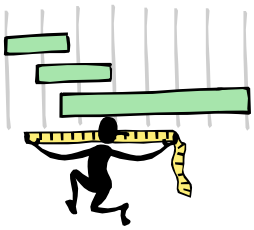
Quantitative measures can be classified as:
1) Effectiveness (eg achievement of service levels, such as SAIDI);
2) Efficiency (eg economy in use of resources such as O&M costs/km of distribution line);

3) Volume (eg activity levels, typically used for planning purposes such as for inventory levels).

It might also be remembered that it is possible that the more important functions are more difficult to measure and are therefore often the least benchmarked. It is better to imperfectly measure what is important than to precisely measure the barely relevant or irrelevant.

Analysis of the data can be done using process management tools (i.e. the six tools of quality); i.e.:

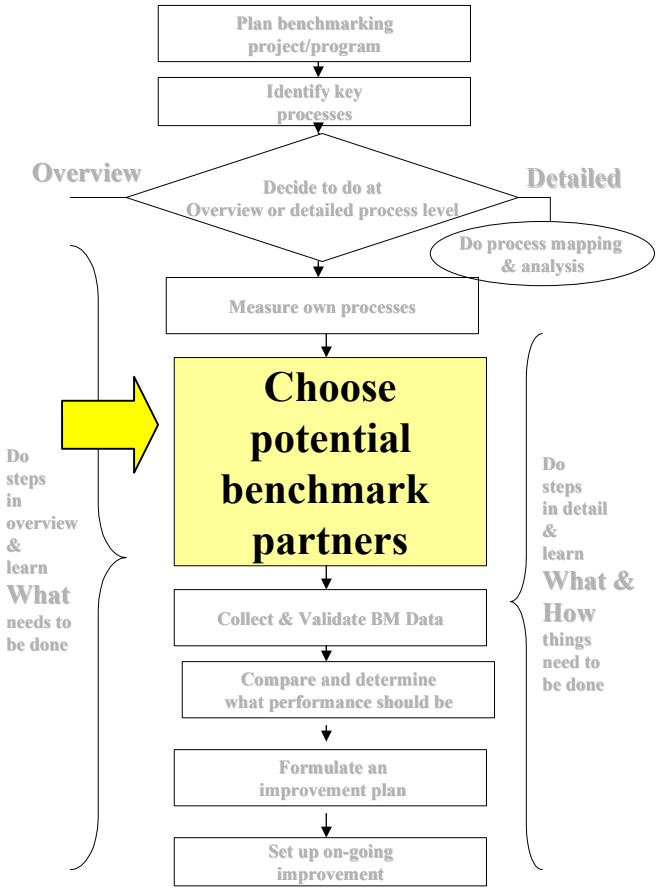
1) Check sheets;
2) Cause and effect (fish bone) diagrams;
3) Graphing;
4) Pareto charts;
5) Solution matrix;
6) Financial tools.



These are generally simple but useful techniques and are illustrated at **Appendix D.** Some financial and other technical tools may involve some complexity; however, relevant skills are usually available within a utility to help with their application.

Also, as indicated previously it is important to interpret results within the context of use of a basket of indicators in order to ensure proper balance of view (ie through use of balanced scorecards) and through relating costs to service levels and the "trade-offs" inevitably involved (ie through use of performance quadrants).

F Choose Potential Benchmark Partners



Overall, overview, benchmarking needs to be with other power utilities; eg in the:
1) **Pacific;**
2) **Caribbean;**
3) **Public Power Association of American**

Australian utilities and TNB Malaysia have interesting, and published, performance standards.

Detailed process benchmarking can be with like functions in different industries.

Partners can be from the same or similar industries, or if benchmarking a particular function, partners can be from dissimilar industries.

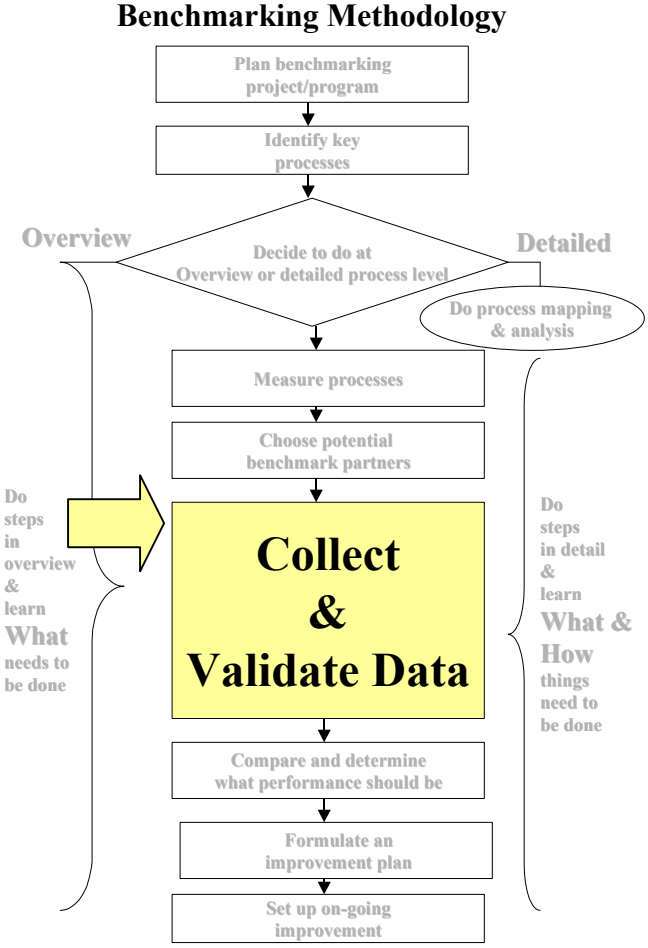
While overall comparisons of key performance indicators must generally be made between utilities in the same field, benchmarking of individual functions need not be. Indeed the most interesting and potentially the most rewarding comparisons are likely to be between same/similar functions in dissimilar industries where participants are not conditioned by similar experiences and expectations. In Island economies, there would generally be scope for benchmarking of individual functions on this local basis between dissimilar industries, including private/public sector exchanges. For the purposes of the PPA-ADB current round of benchmarking this has been determined as other Pacific Island Utilities.

Generally or for more detailed process benchmarking, Pacific utilities might like to take the following into account when selecting potential benchmark partners;

1) It is worthwhile properly researching which other organizations might be good benchmark partners because costs of on-going benchmarking can be substantial and should not be invalidated or diminished in value by poor partner choice;

2) The Pacific will probably provide good like-to-like comparisons which will make benchmarking easy;
3) However, benchmarking outside the Pacific is more likely to reveal best-practice comparisons;
4) The largely investor owned Caribbean utilities might make interesting comparisons;
5) Likely good access to Australian statistics plus good Australian utility performance close to international best practice makes at least some comparisons potentially appealing. Additionally, the potential to make comparison involving both public and investor owned Australian utilities adds to the attraction. But of course, scale of operations in Australia is far greater;
6) Utilities in the American Public Power Association often share small scale and public ownership characteristics with Pacific utilities. Additionally, these utilities often need to directly compete or come under peer pressure to perform as well as private utilities. So comparisons here could be interesting; however, more likely than not they directly take power or back-up from a regional grid which makes many comparisons unfair; eg regarding outage times;
7) Asian utilities are generally on a much bigger scale; however, Malaysia's Tenarga National's (TNB) service levels make interesting comparisons. TNB is now competing with independent power utilities (IPUs)(which typically are very small) and the IPUs are now compelled (as part of their franchise commitment) to provide equal to or better than TNB's service levels.

G Collect and Validate Benchmarking Data



Collection can be by:

- **Internet**
- **Annual reports**
- **Trade shows**
- **Public addresses**
- **Journal articles**
- **Telephone survey**
- **Questionnaire**
- **Exchanging notes (eg on processes)**
- **Visits**

Draft results need to be segregated into the following differences

- **Demographic**
- **Accounting/stats**
- **Service levels**
- **Efficiencies**

Data and results should be validated, preferably in workshop sessions

Data can be collected one or more of the following ways:

1) Internet searches;
2) Annual reports (which often include KPI results);
3) Trade shows;
4) Public addresses;
5) Journal articles;
6) Telephone survey;
7) Questionnaire survey;
8) Exchange of information (ie process maps and statistics);
9) Inter-utility visits.

Methods of collection will need to suit your needs and budget.

Questions need to be validated as well as answers. For example, try to answer the questions included in your own intended questionnaire.

Generally, it is best to identify your needs first, exchange what information you can and only then go on field visits (ie actual visits should not be “fishing expeditions” or “industrial tourism”).

When comparing data between benchmarking partners, considerable effort needs to be undertaken in confirming definitions and trying to achieve comparability.

Overview benchmarking can use more general data such as those reflected in commonly used power industry KPIs and PIs, taking into at least some account of the above factors.

However, detailed benchmarking needs to "drill down" into specific differences such as relativities in:

1) systems maintained; eg numbers of poles inspected, transformers maintained etc;
2) costs incurred; eg labour, materials and ownership costs such as leasing;
3) processes used;
4) demographic differences, such as customer density, customer characteristics (such as a dominant HV user), vegetation, accessibility and the like.

Data needs to be normalised to facilitate comparability; eg cost/km; revenue/unit etc.

Differences between utilities in benchmark data can generally be attributable to one or more of four factors:

1) demography differences;
2) accounting/statistical differences (i.e. in the way data is measured and collected)
3) service level differences;
4) efficiency differences.

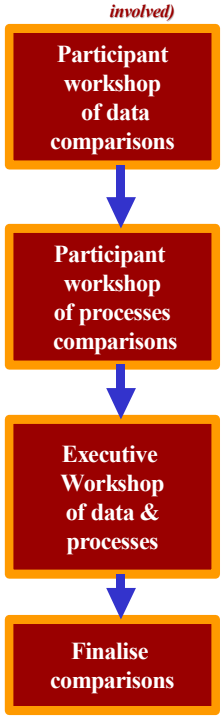
These differences need to be analysed to ensure demography differences are understood and appreciated, accounting/statistical differences are minimised and service level and efficiency differences are accurate – as a basis for assessment of benchmark performance. In large, well developed benchmark databases, demographic differences will often be quantified and used to adjust raw data as a means of facilitating comparisons. The problem with this is that such weighting can often "drive" a large part of benchmark performance outcomes. The Pacific power utility benchmark database has not been developed to the extent that this needs to be taken into account as yet.

Generally there is a "healthy" scepticism regarding benchmark data; i.e. not really meaning what it purportedly portrays. Therefore, is important in the collection and validation process to involve potential users of that data. Below is a suggested series of steps, which should be considered in the benchmark data collection and validation, which is designed to obtain commitment from participants and promote confidence in data and validation. It is suggested that:

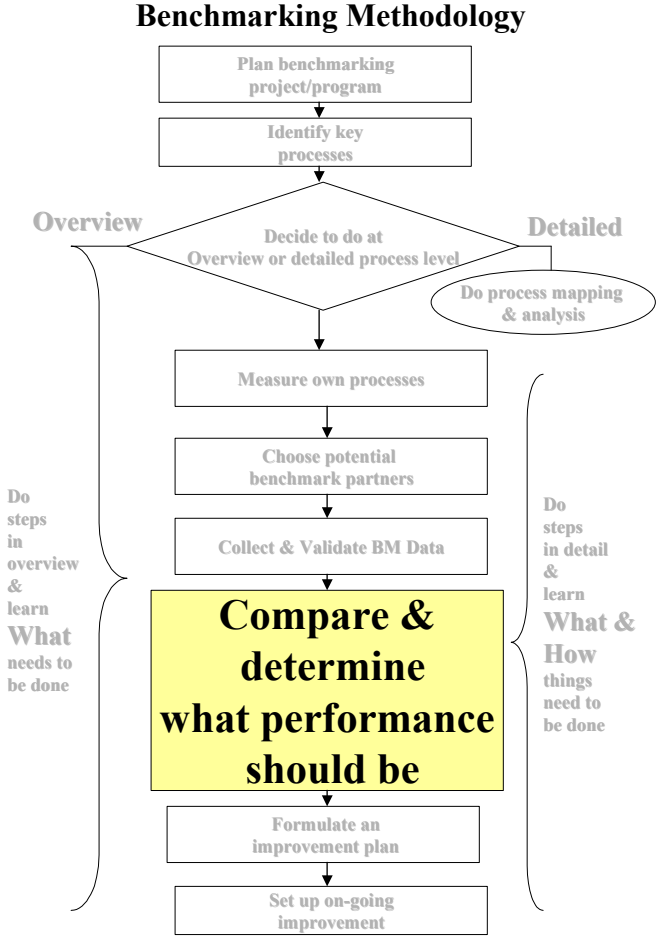
1) improvement team participants workshop both data and process differences perhaps over a series of at least two workshops; and that
2) executive representatives get involved in at least a combined workshop of data and process differences in order that their objectives and concerns can be fully addressed in benchmark outcomes.

Steps for Validation

(May be done for data only when process mapping & analysis is not involved)



H Compare and Determine What Performance Should Be



Compare performance
- **Service levels**
- **Efficiency**

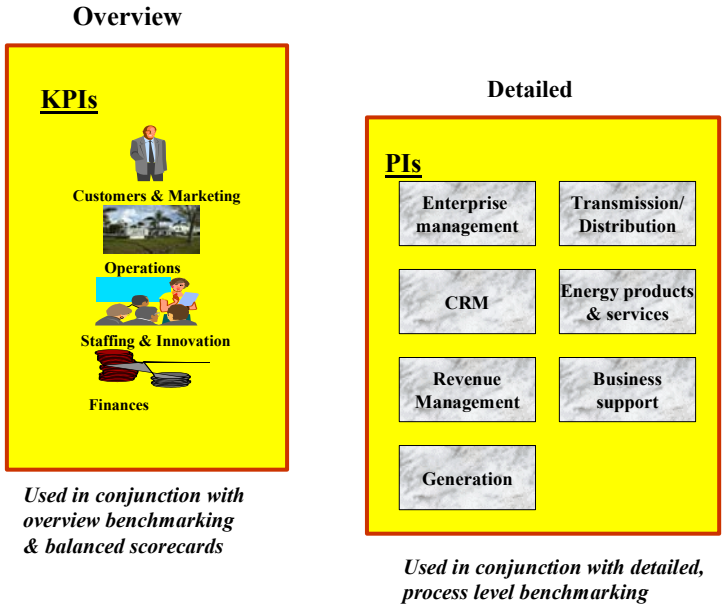
Identify "gaps" between current and better performance

Project trends; i.e. will gap get bigger or smaller over time

Establish targets for closing gaps, near and longer terms.

Data can be divided into overview KPIs for use in balanced scorecards and overview benchmarking and PIs for more detailed process analysis and benchmarking, as illustrated below.

Two Tiers of Measures



These KPIs and PIs are elaborated upon in **Appendix E**, which sets out:
1) Purpose of indicators;
2) Data required;
3) How calculated; and
4) Suggested benchmarks and reference values.

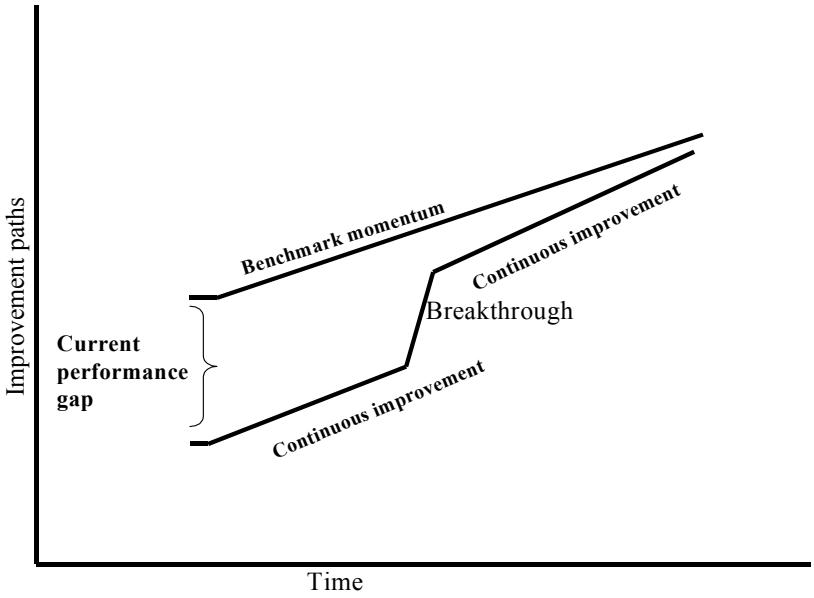
In analysis, data should be:
1) Considered in the context of balanced scorecards to ensure a properly balanced view is considered;
2) Also analysed, at least selectively, in terms of "performance quadrants" to determine more comprehensively where your utility is situated regarding both service levels and efficiency; remembering it is best, if you can, to be in the high service level-high efficiency quadrant.

Determine What Performance Should Be

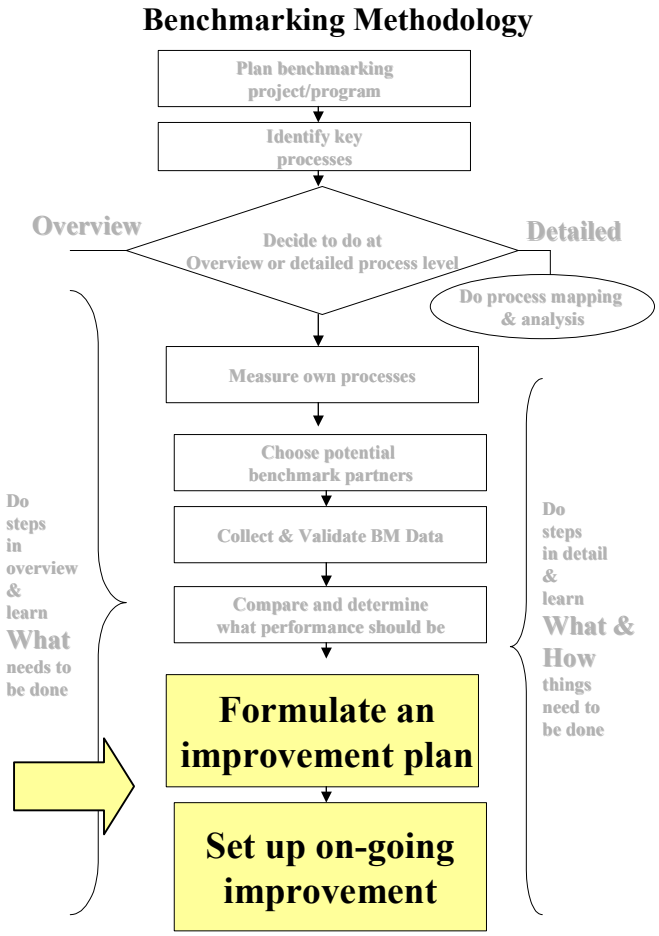
Next step is to measure the difference between Benchmark and current performance.

This gap needs to be evaluated in terms of:
1) Quantum of difference;
2) Prospects for the future; i.e. is momentum actually closing or widening the gap over time. Consideration of this will determine the extent and nature of improvement required.

Momentum Line & Performance Gap



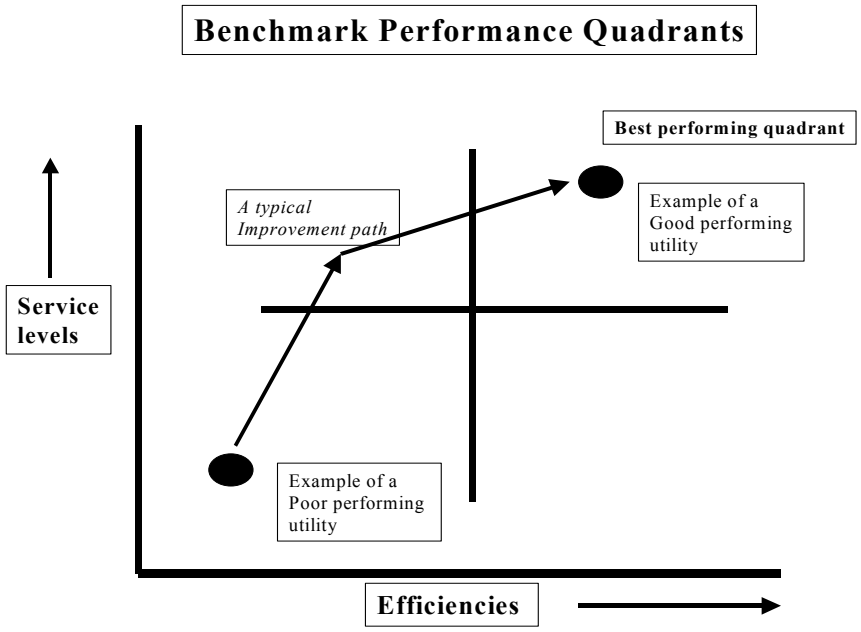
I Formulate an Improvement Plan and Set up Improvement



Improvement plan will probably include:
1) **Improving service levels**
2) **Improving efficiency**

This is likely to be achieved through a combination of:
1) **Breakthrough improvements**
2) **Continuous improvement**

Actions need to be planned and acted upon to achieve improvement towards best-practice benchmarked performance. A typical improvement path for a utility (as illustrated below) might be to concentrate first upon achieving improved service levels and then improving efficiencies.



However, individual utilities will need to choose improvement paths suitable to their own particular circumstances. Indeed, utilities may choose as a matter of strategy to be in the low service level but efficient quadrant. Such choices are entirely up to them, their customers and Board of Directors.

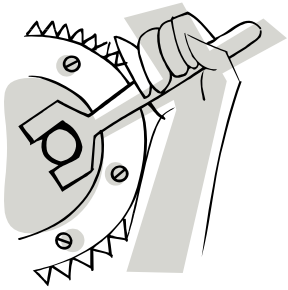
In undertaking the benchmarking exercise, you should have managers and staff looking at, measuring and improving processes and by repeating this cycle you should be able to set up both breakthrough and continuous improvement.

As indicated above, improvements can be breakthrough or continuous.

Breakthrough Improvements

Breakthrough improvements are more likely to occur as a result of strategic, overview benchmarking where possible whole new and different approaches may be considered.

Continuous Improvements
Continuous improvement is more likely to occur in operational benchmarking where decision considerations are more likely to be tactical than strategic.



But Must Consider Both
It is important to consider both possible improvement paths because sometimes the largest and most intractable problems can only be solved by applying a multitude of small improvement steps, all of which add up to a required sizeable solution.

A **Implement Improvement Program**
Implement the improvement program

VII FUTURE DIRECTIONS

A Incorporate Benchmarking in Way Things are Done

As envisaged, overview benchmarking will be reviewed annually at the PPA Annual Conference and in the interim more detailed process benchmarking can be done by individual utilities.

B Training

Training needs to occur in benchmarking and problem solving skills in order to support and give impetus to the benchmarking program.

C Deployment

Particularly because of the detailed involved, management will need to deploy much of the benchmarking program and achieve results on a team basis.

D Focus on Customers

Much more focus in future needs to be given to customer service and satisfaction. In order to catch up to best practice, the Pacific utilities will need not only to improve their core competencies but also now to extend and begin to excel in customer service, as is occurring in all other industries including the power industry.

A central part of this focus will be in conducting customer surveys.

The first good foundation for establishing what to benchmark is to ask customers what they want (eg by general survey or convening customer focus groups).

E Focus on Projected Benchmarks and Goals

Peer pressure in the form of benchmarks, as a surrogate for competition, should be used in a constructive way to promote improved performance.

F Routinely Include in Business Planning and Monitoring

Priority should be towards benchmarking future performance (ie the past cannot be changed, only the future). Accordingly, planning should routinely include comparisons to benchmarks, current and projected, and inclusion of commitments towards best practice.

G Promote Organisational Learning

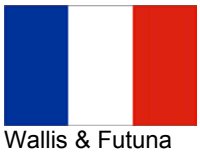
Benchmarking, particularly using improvement teams, is an important way to promote organisational learning. Organisational learning is important because it promotes the sustainability of organizations to remain relevant and competitive into the future.

Appendices

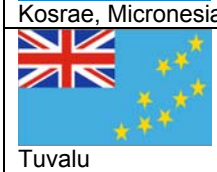
Appendix A

Pacific Island Power Utilities

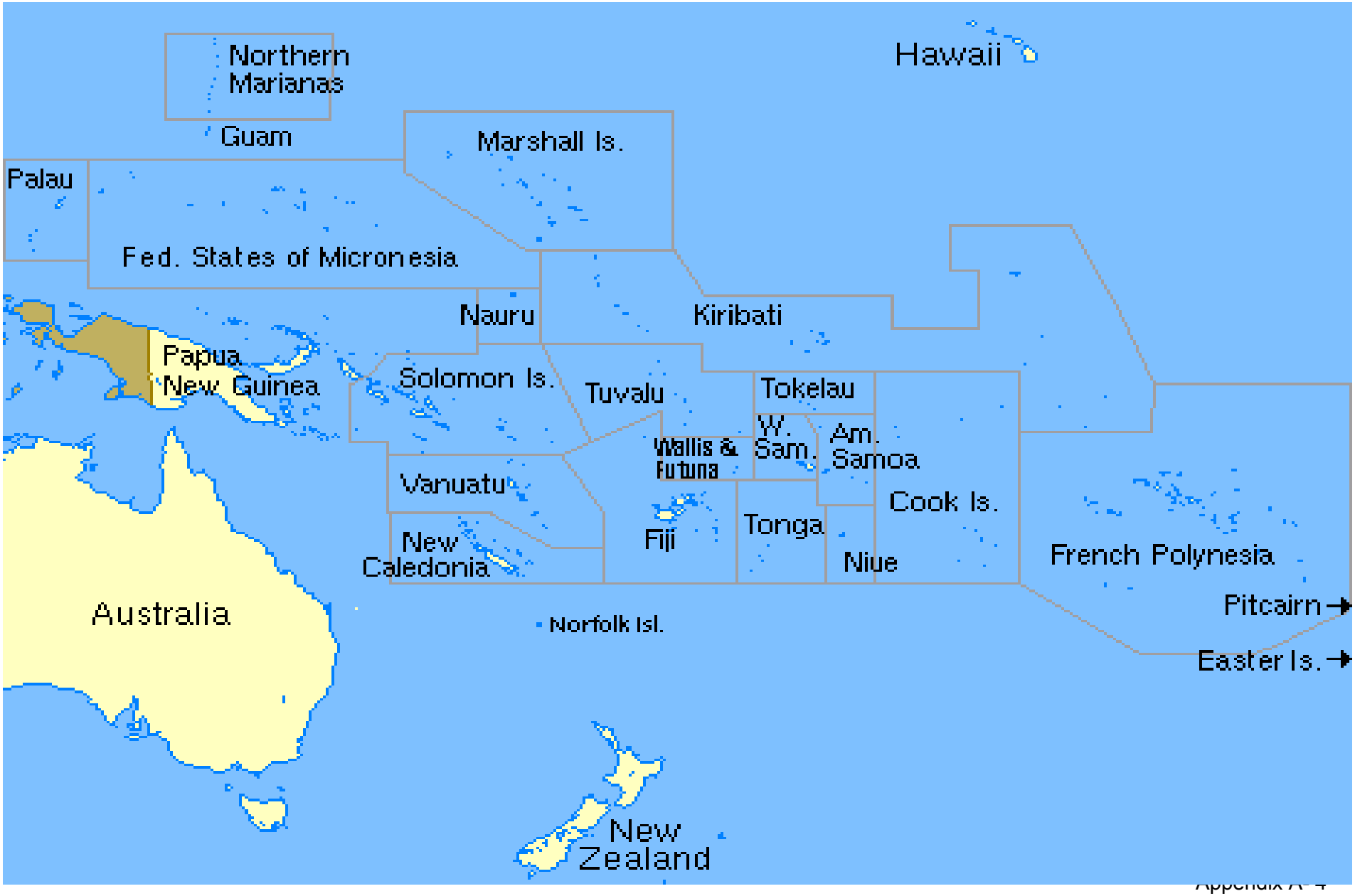
APPENDIX A
Pacific Power Utilities & Map

Country/State	Power Utility	Generation Capacity MW	Gross Generation MWh	Maximum Demand MW	Customers Number
 French Polynesia	Electricity de Tahiti				
 Cook Is	Te Aponga Uira O Tumu-Te-Varovaro (TAU)	8.0	22,270	3.7	3,520
 Samoa	Electric Power Corporation (EPC)	26.7	85,270	14.5	21,831
 Samoa	Powertok				
 American Samoa	American Samoa Power Authority (ASPA)	40.2	169,000	24.2	10,000
 Tonga	TEPB (Operations now franchised)			6.0	14,200
 Ebeye	Kajur	4.4	15,384	2.3	1,000
 Wallis & Futuna	Electricitie et Eau de Wallis et Futuna				
 Fiji	Fiji Electricity Authority (FEA)	167	569,487	98	116,000
 New Caledonia	Electricitie et Eau de Caledonie (EEC)			66.7	44,658
 New Caledonia	Enercal	318.6	1,599,500	233.9	18,838

Country/State	Power Utility	Generation Capacity MW	Gross Generation MWh	Maximum Demand MW	Customers Number
 Vanuatu	Societe d-Union Electrique du Vanautu				
 Solomon Is	Solomon Island Electricity Authority (SIEA)	23.6	49,630	10.3	6,000
 Papua New Guinea	PNG Electricity Authority	302.0	770,000	147.2	71,600
 Guam	Guam Power Authority				
 Saipan, Northern Marianas	Commonwealth Utilities Commission (CUC)				
 Palau	Palau, Public Utilities Corporation (PPUC)	24.9	100,400	15.5	4,805
 Yap	Yap State Public Service Corporation				
 Chuuk, Micronesia	Chuuk Public Utility Corporation (CPUC)	7.6	23,558	4.12	2,112
 Pohnpei	Pohnpei Utilities Commission	21	39,892	6.6	5,778
 Kiribati	Public Utilities Board	3.8	1,480	2.7	4,200

Country/State	Power Utility	Generation Capacity MW	Gross Generation MWh	Maximum Demand MW	Customers Number
 Kosrae, Micronesia	Kosrae Utilities Authority (KUA)	5.6	8,350	1.6	1,487
 Tuvalu	Tuvalu Electricity Corporation (TEC)				
 Niue	Niue Power Corporation	1.8	3000	0.6	1,012
 Marshalls	Marshalls Energy Company				
 Marshalls	Kwajalein Atoll Joint Utility Resources				

Map of Pacific



Appendix B
What Customers Want

What Customers Want

Customer Surveys

Why

Indicators of customer satisfaction are usually important in benchmarking. Customers are the final arbiters of success of commercial business either directly in the market place for a competitive enterprise or indirectly through the ballot box and governance arrangements for a natural, government owned monopoly.

The most direct way to find out what customer want is to ask them. Following we discuss:

1) Who should be interviewed;
2) What should be measured and what do the measurements mean;
3) How should the interviews be carried out;
4) When should survey's be undertaken

Who

The interview program should include:

1) existing customers segmented into groups with different needs and different service standard requirements; and possibly
2) potential new customers; for example:
   a) Businesses contemplating investing in the Island and government agencies endeavouring to attract such investment;
   b) Consumers not yet supplied – to ascertain their potential requirements thereby helping to formulate service expansion programs.

What

Overall satisfaction to be measured, usually involves customer satisfaction with the following characteristics:

1) Quality of electricity (usually voltage)
2) Quality of delivery (availability and reliability);
3) Quality of service (responsiveness to applications, enquiries etc);
4) The reputation of the corporation (i.e. ease of doing business, trustworthiness);
5) Value for money.

Question areas to be considered (phrasing of questions can be done by marketing specialists, possibly including review from pilot interviews) are as indicated in the following **Illustration.**

Illustration
Contents of Questionnaire Survey

Question Areas	Substance of Questions to be Asked (i.e. Customers should be asked to rank satisfaction)
Quality of supply **Quality of delivery**	Voltage stability Unplanned outages Scheduled outages Connection times Meter reading timeliness and accuracy Estimated readings
Quality of service	Enquiries handling Complaints handling Timeliness and clarity of invoices Treatment regarding payments enquiries and outstanding accounts Treatment regarding refunds of deposits Education and sponsorship of energy conservation
Reputation	Ease of dealing with the organization, including attitudes, counter and telephone services, hours and days of opening
Value for money	Value for money rating
Overall satisfaction	Overall satisfaction

The above question areas are those usually addressed in power industry surveys of customer satisfaction. Usually scores can be ranked on a scale of 10 or less (for simplicity) but can be translated in analysis into a percentage. There seems to be merit in "forcing decisions" from consumers; i.e. not providing an indifferent rating box in the measuring scale. By asking for an "overall satisfaction" scoring, it is then possible by correlation analyse to assess which factors most contribute to that overall outcome.

Survey results seem to fall into the categories in the following **Illustration.**

Illustration
Interpretation of Customer Surveys

Survey Result	Most likely Interpretation
80% - 100%	Market leader
70-80%	OK, but needs remedies and improvements
Below 70%	Serious problems exist. Either the enterprise is transformed or otherwise it will go out of business; either by customer defections in a competitive market or Government decree through likely pressure from dissatisfied customers through the polls.

How

Satisfaction can be surveyed by:

1) Post;
2) Focus group interviews;
3) Telephone interviews;

or a combination of the above.

When

A major survey should be done at least once per annum; however, there is merit in conducting progressive mini-surveys throughout the year in order to obtain indicators of possible trends which can be addressed prior to year-end results being obtained through the major survey.

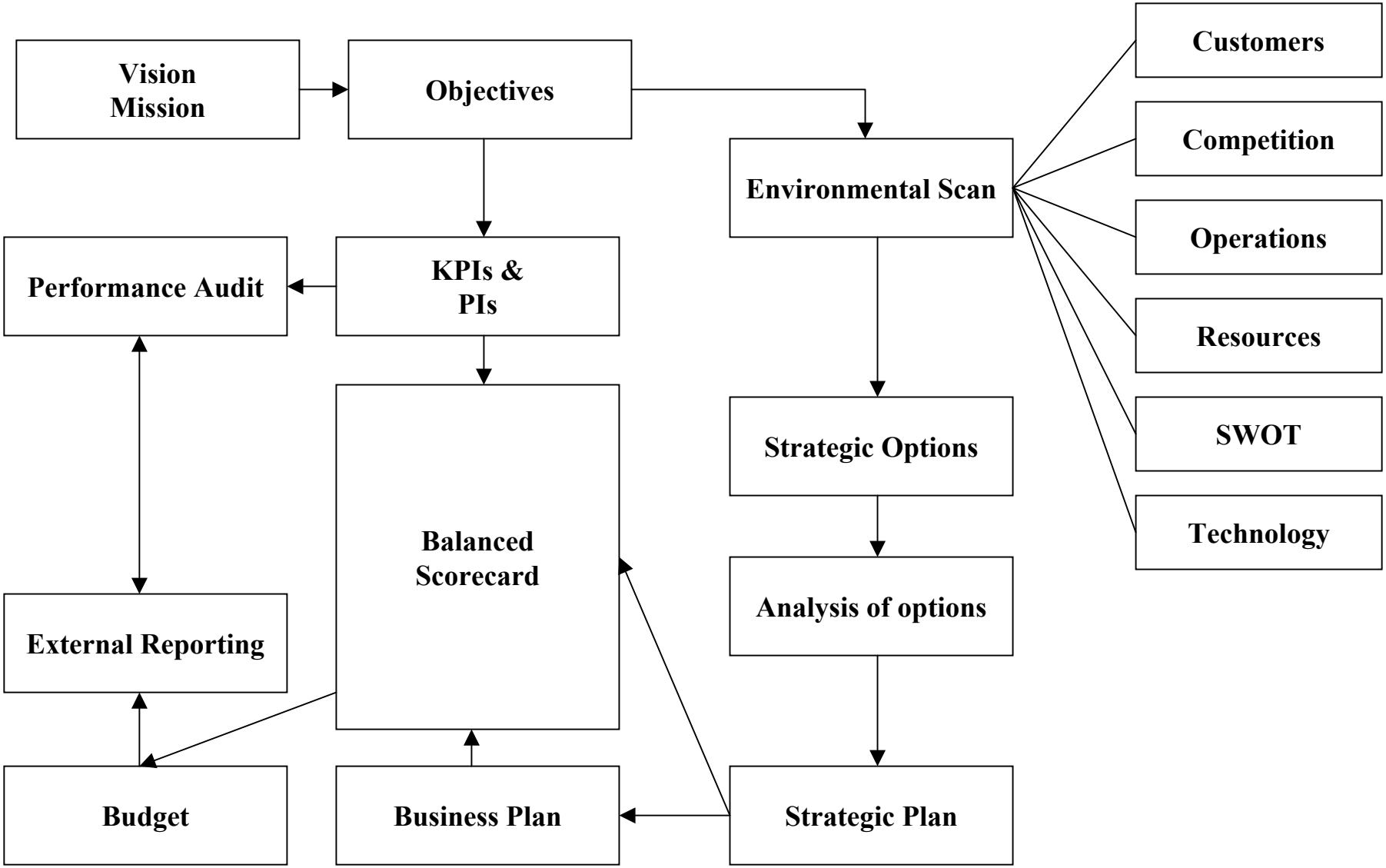
Such mini-surveys can be undertaken through such means as:

1) Focussed customer workshops; or
2) Selective postal surveys; or
3) Selective telephone surveys.

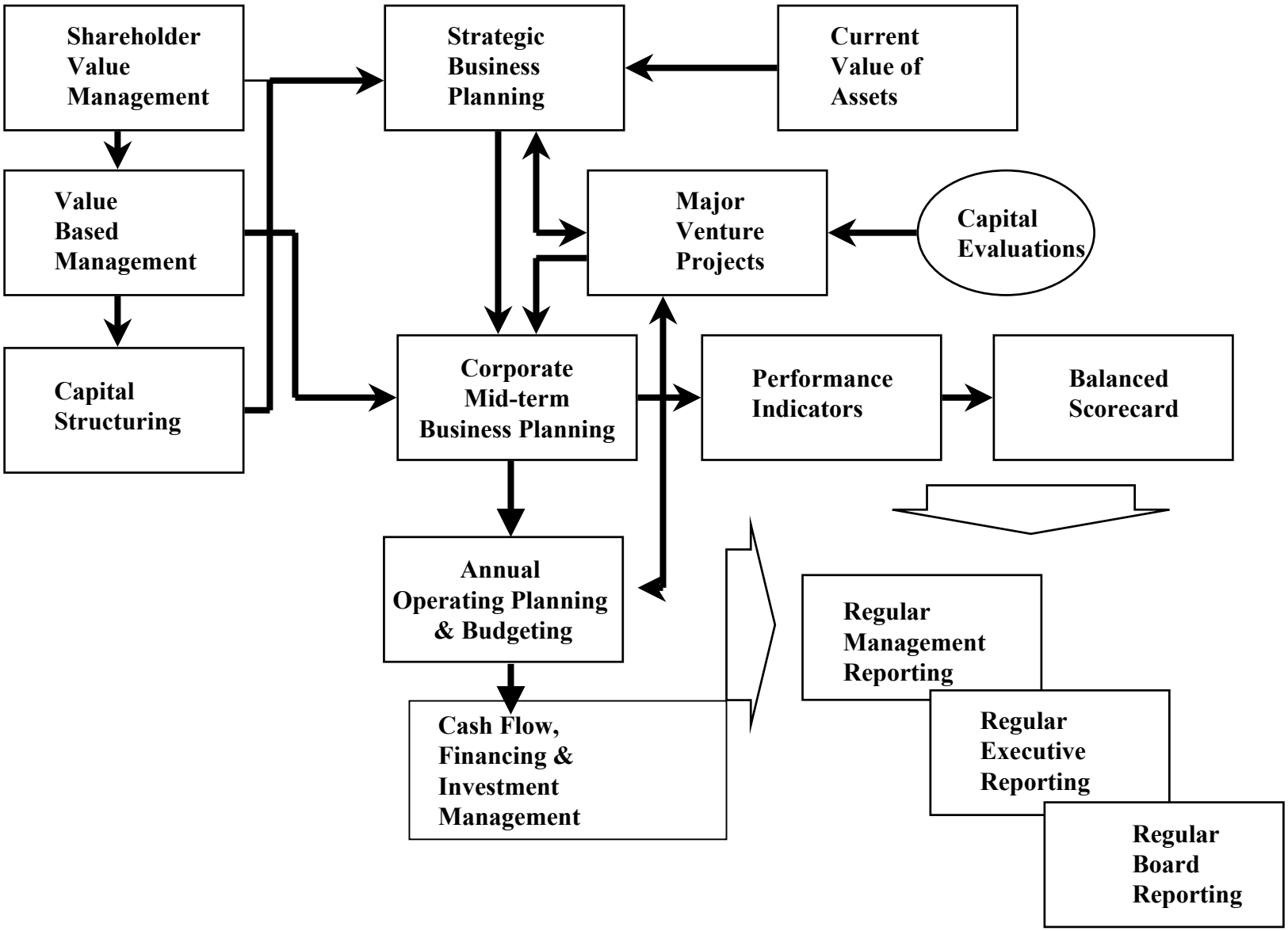
Appendix C

Examples of Power Utility Processes

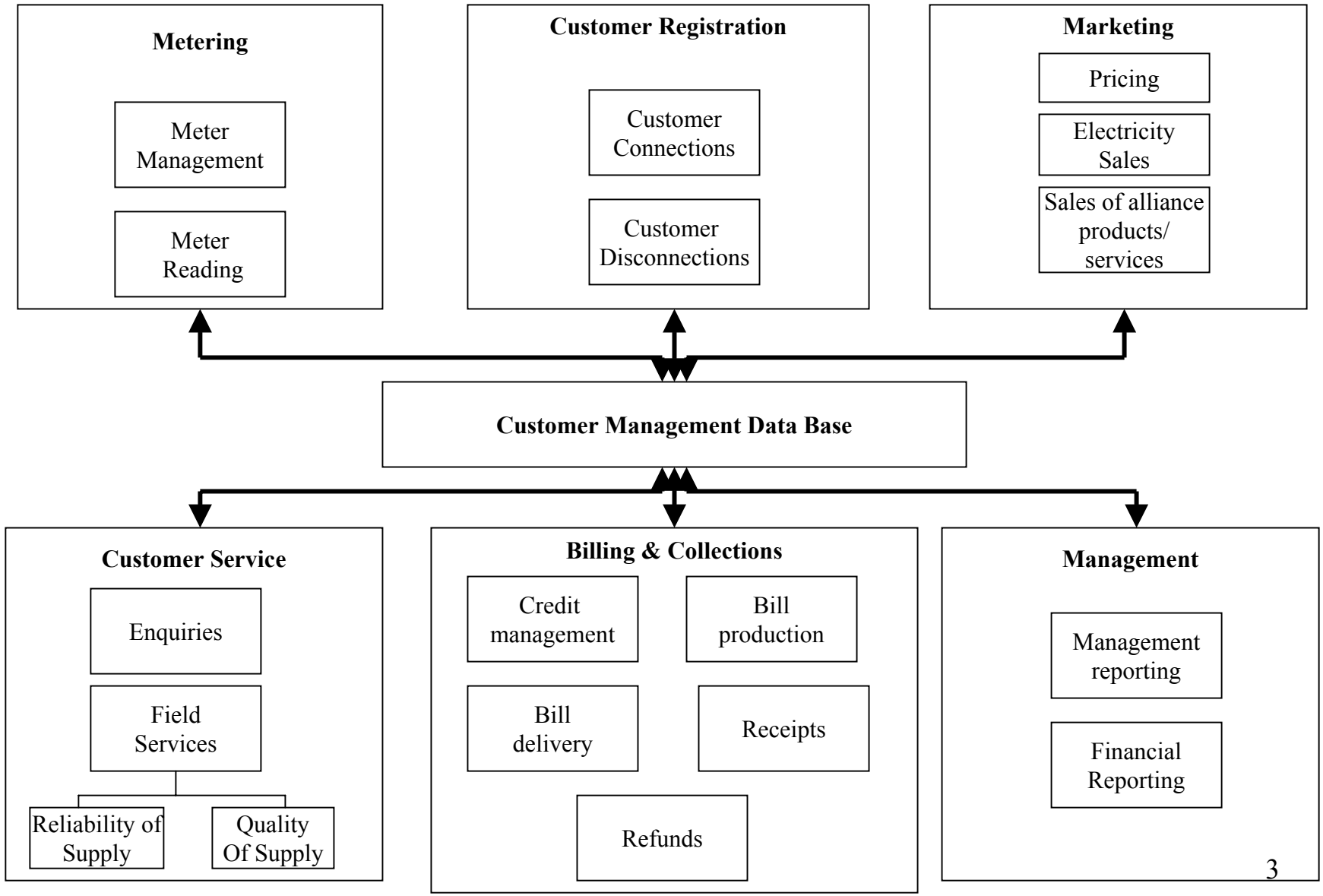
Enterprise – Strategic Management



Enterprise Financial Management

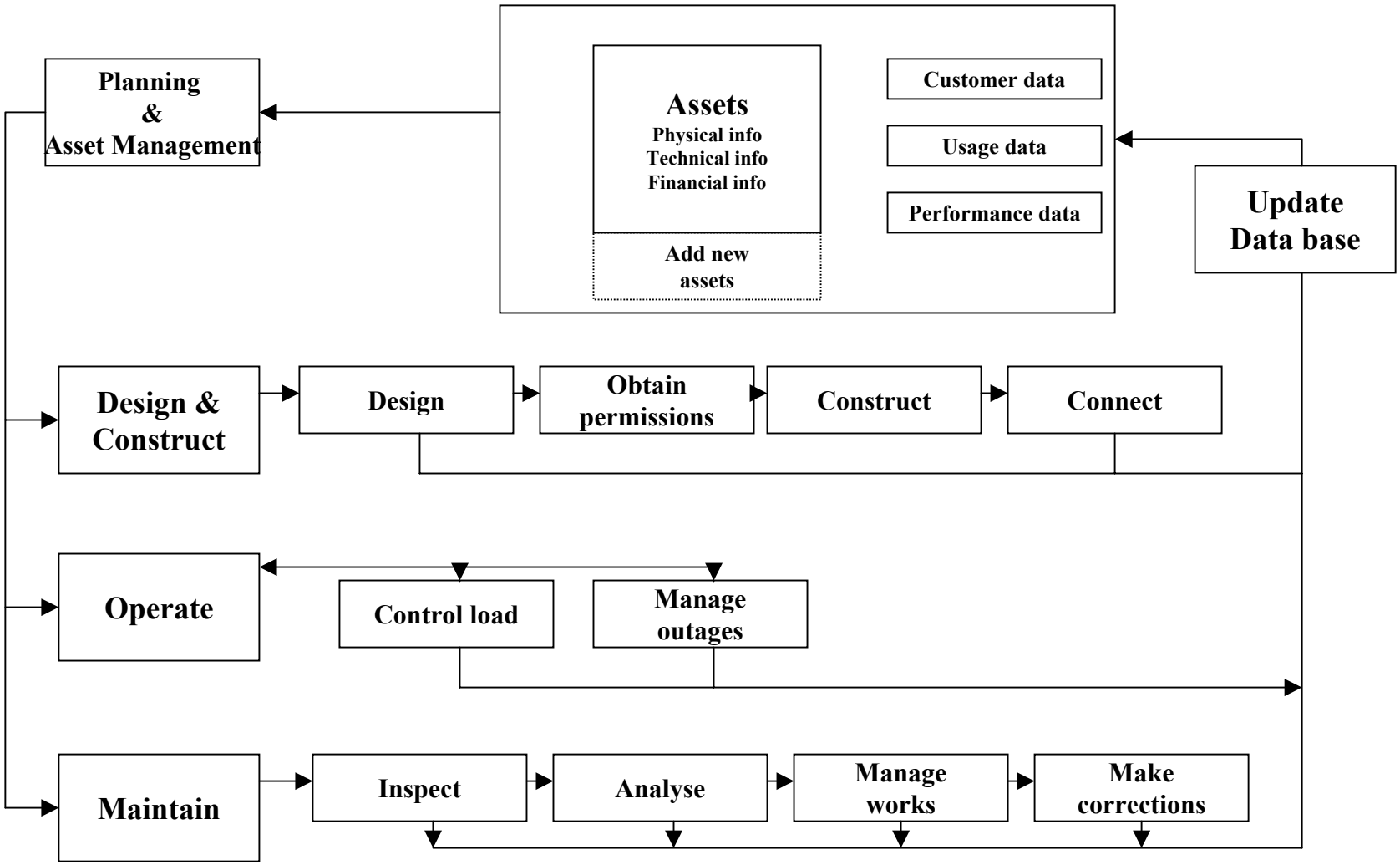


Combined Customer Relationship Management, Revenue Management & Energy Products and Services

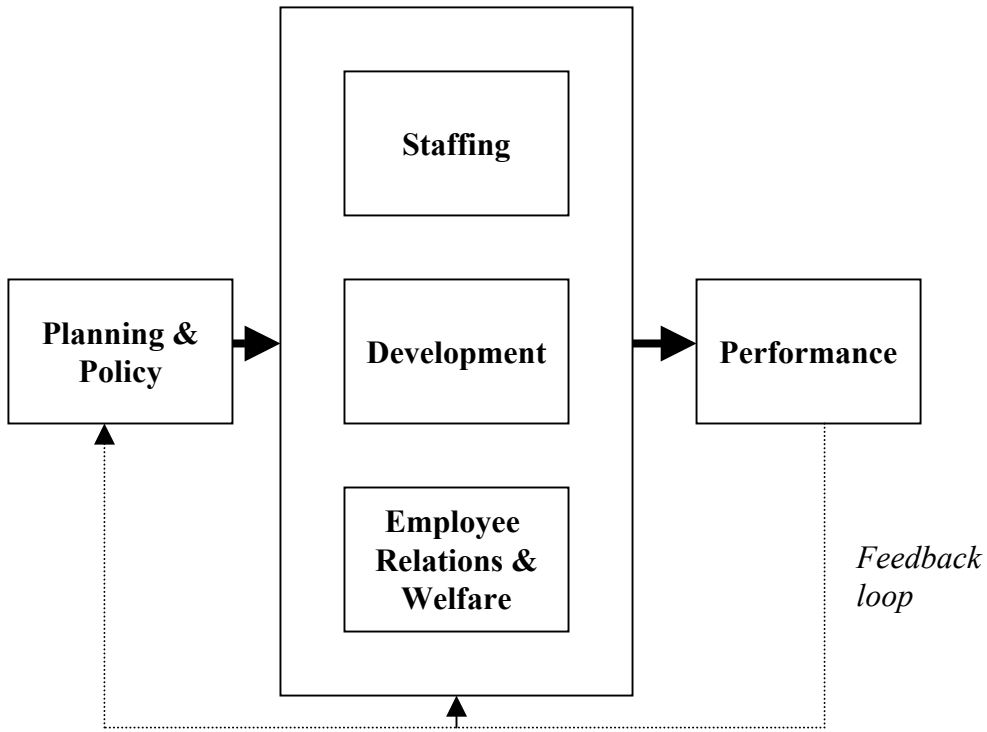


Appendix C

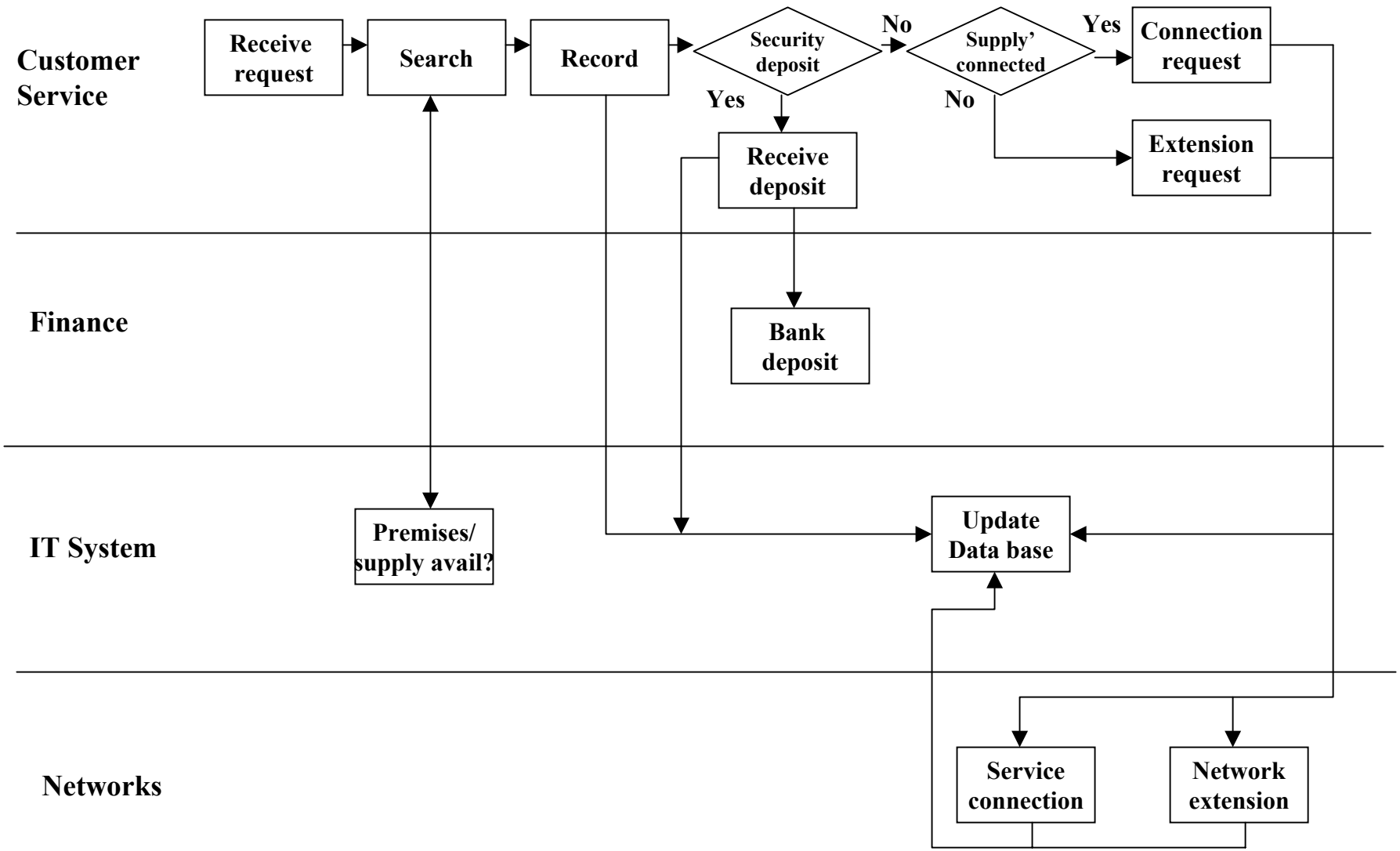
Transmission & Distribution



Business Support – HR Processes



Customer Connection Processes



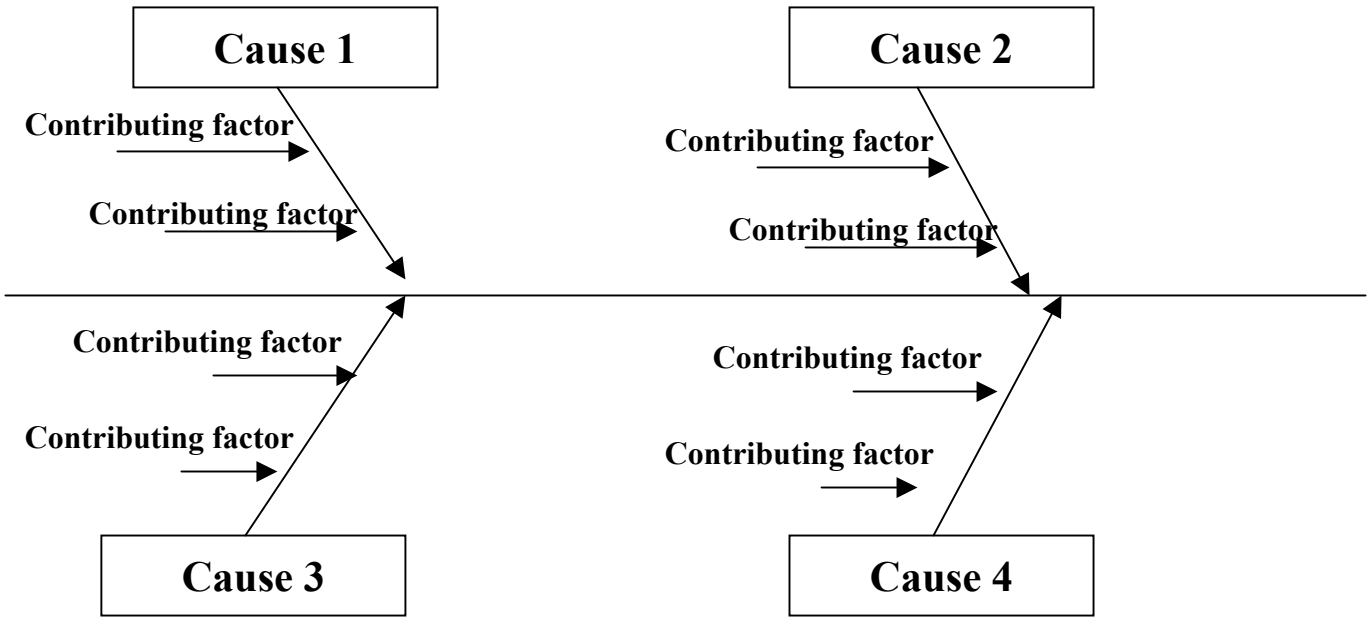
Appendix D

Benchmarking Analysis Tools

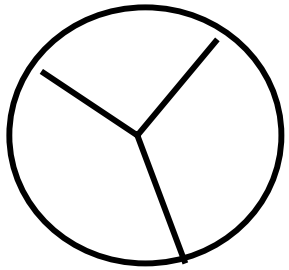
Problem Identification Tool
Eg. Check Sheet: Outages

Periods/ Causes	July	August	Sept	Oct	Nov	Dec
Gen plant failures	111	~~1111~~	11	11	111	1111
Transmision problems	11	11	11	~~1111~~	11	11
Distribution problems	1	1	11	1	1	1
Totals	**6**	**9**	**6**	**8**	**6**	**9**

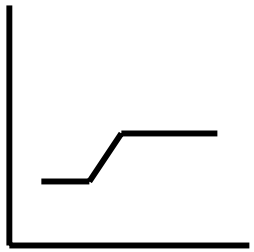
Problem Identification Tool
Cause & Effect Diagram



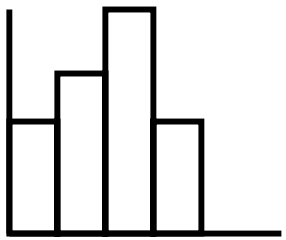
Graphing for Problems & Solutions



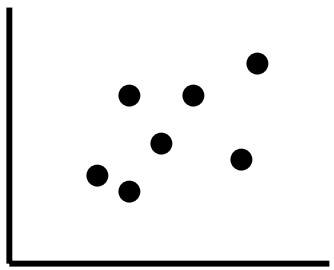
Pie Charts



Line graphs

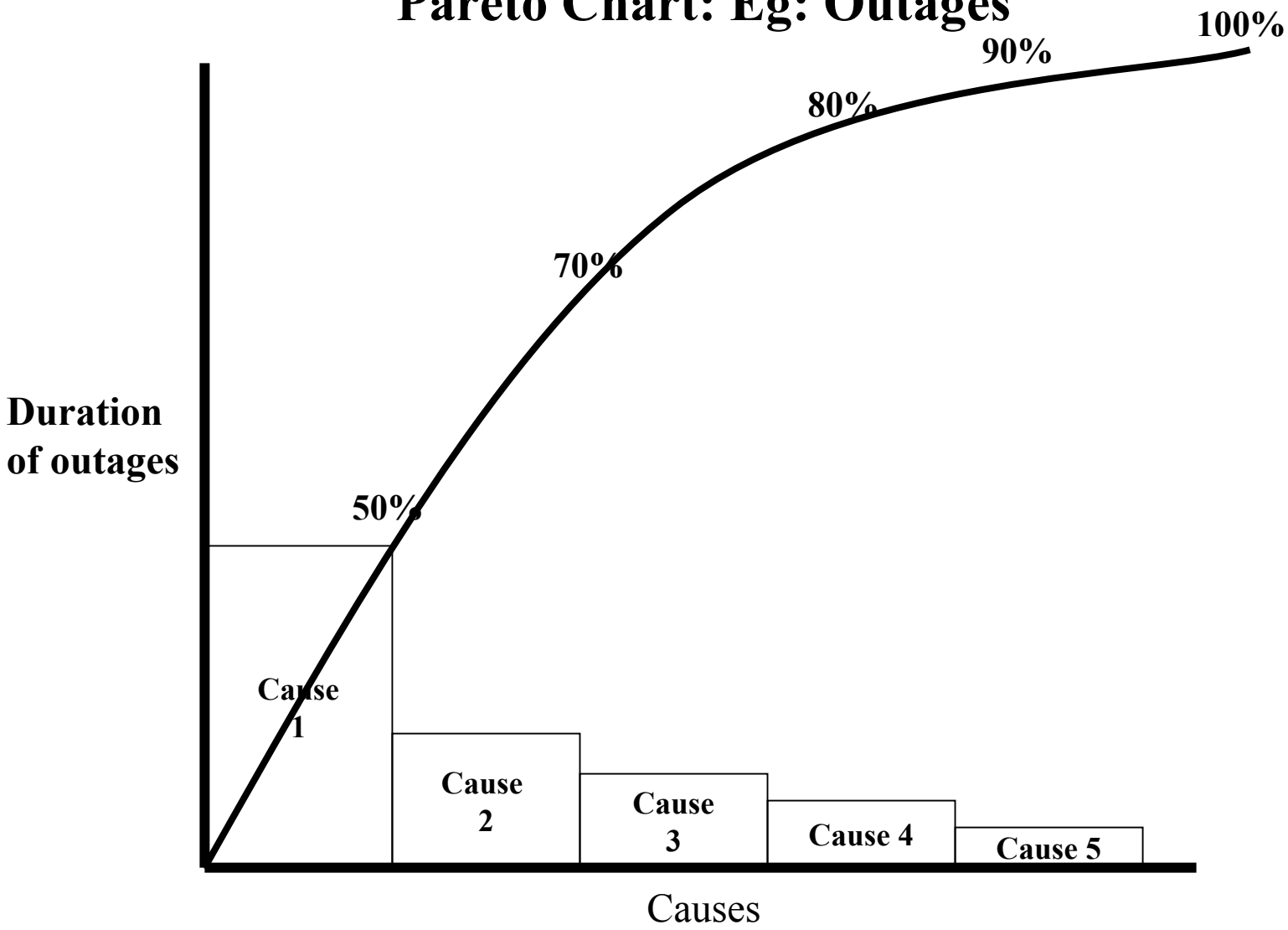


Bar graphs

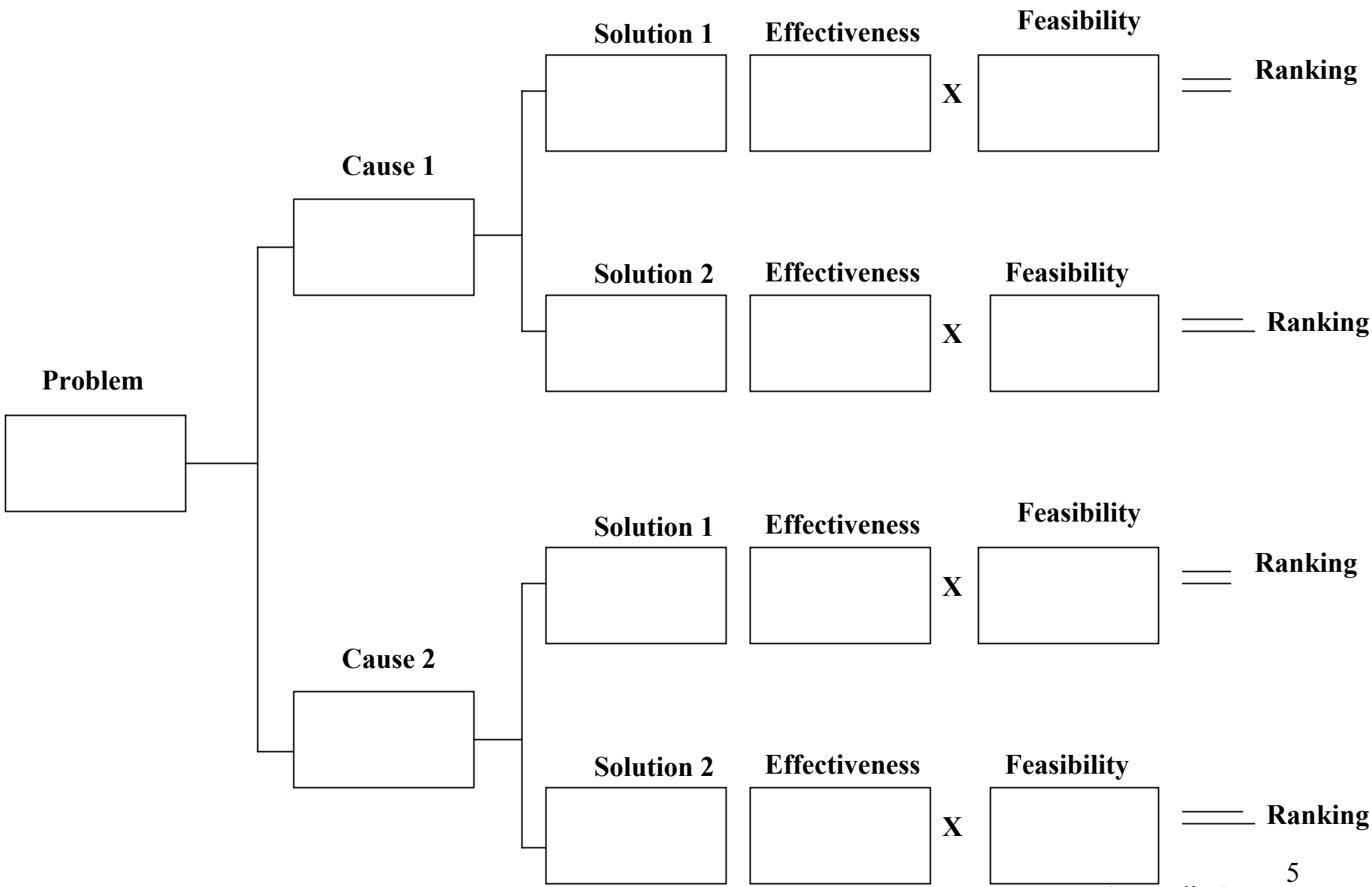


Scatter diagram (particularly useful for correlation analysis)

Problem Or Solution Ranking Tool
Pareto Chart: Eg: Outages



Solution Ranking Tool
Solution Matrix



Some Financial Evaluation Tools

1

Net Present Value Analysis

Benefits — **Costs** = **Net benefits**

These can be ranked
(need to be careful about re-investment assumptions)

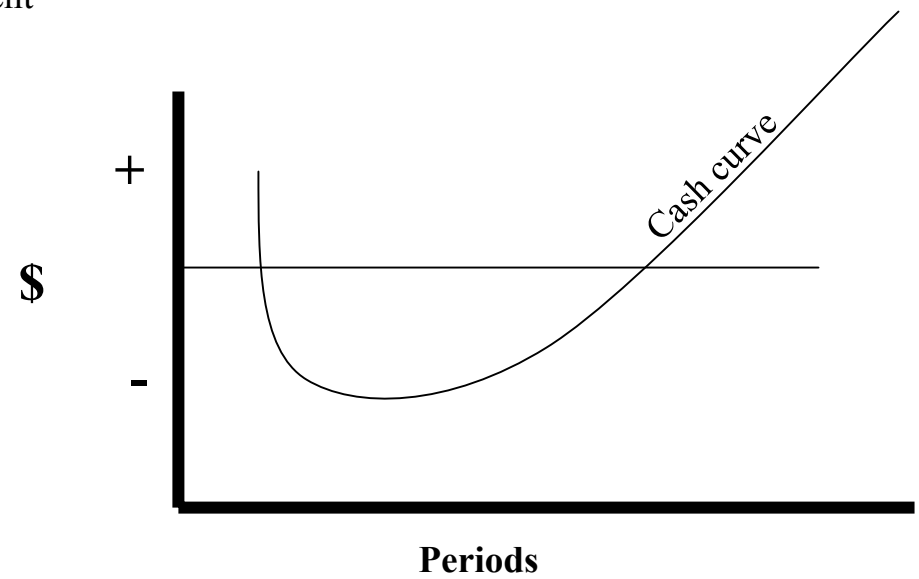
2

Payback Period Assessment

$$\frac{\textbf{Recurrent Benefits}}{\textbf{Capital cost}} = \textbf{Payback period}$$

3

Cash Curve Assessment



Appendix E

Sample Power Indicators

APPENDIX E
Sample Indicators

Overview Level KPIs

Overview Measures

Used in conjunction with overview benchmarking & balanced scorecards

KPIs are Key Performance Indicators and are used at the strategic or overview level in benchmarking

Following is a sample of KPIs for power utilities (in Balanced Scorecard order)

Legend:

APPA: American Public Power Association
ESAA: Electricity Supply Association of Australia
PPA: Pacific Power Association

KPI	Purpose of managing the indicator	Data Required	How Calculated	Suggested Benchmarks & Reference Values **Pacific data 2000 & 2001** **ESAA data 1999** **APPA data: 2000** **Other: as specified**
Customers & Marketing				
Customer Satisfaction	Satisfaction compared to target	Focus groups General survey	Focus group results General survey results 1) Ask about satisfaction regarding specific aspects; 2) Ask overall satisfaction 3) Correlate 1) & 2) to identify "value drivers' ie of customer satisfaction	Satisfaction levels: 80% -100% good. >90% required for re-purchase in competitive market 70%-80% OK but needs remedies < 70% needs major overhaul
Energy (Electricity) Sold	Sales compared to target	Sales data by customer segment	From meter readings	
Load factor	Promote peak shaving strategies	Annual generation Peak generation	$\frac{\text{Annual generation MWh} * 100}{\text{Installed generation capacity} * \text{period hours (8,760)}}$	Pacific avg 66% Pacific best practice: 50-80% ESAA : 66.1% International best practice 50% - 80%
Setting of customer care standards	Good customer relationship management	Set standards having regard to customer survey results from above (and then measure	1) Exist: yes or no 2) Adequate: yes or no	Should be: 1) Yes 2) Yes

KPI	Purpose of managing the indicator	Data Required	How Calculated	Suggested Benchmarks & Reference Values Pacific data 2000 & 2001 ESAA data 1999 APPA data: 2000 Other: as specified
		performance)		
Operations				
Quality of supplied energy	Promote primarily voltage stability	Monitoring of supply quality	1) Transformer readings and 2) Special monitoring equipment	+/- permitted range
Availability	Show effectiveness of generation asset management	1) Installed plant capacity 2) MWh losses	$\frac{\text{Installed plant capacity (MW) * Period hours(8760) – MWh losses *100}}{\text{Installed capacity (MW) * Period hours (8760)}}$	Pacific avg = 93% Pacific best practice = 80%-90% ESAA = 90.4% International best practice => 65%
Transmission and Distribution line losses	Minimize wastage	Difference between electricity sent out and sold	$\frac{\text{Energy sent out – Energy sales}}{\text{Energy sent out}}$	Pacific avg = 12.66% Pacific best practice =5% ESAA transmission = 18.99% ESAA distribution = 5.9% APPA utilities: 4.15% International best practice = 5%

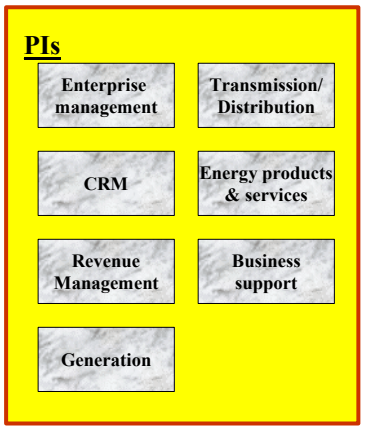
KPI	Purpose of managing the indicator	Data Required	How Calculated	Suggested Benchmarks & Reference Values **Pacific data 2000 & 2001** **ESAA data 1999** **APPA data: 2000** **Other: as specified**
System average interruption duration index (SAIDI)	Minimize loss of supply time	1) Total customer hours without supply 2) Average number of customers	$\frac{\text{Total number of customer hours without supply} * 60}{\text{Average total number of customers}}$	Pacific avg = 624 Pacific best practice = 200 Canada 97/98 = 202 New Zealand 96/97 = 175 Korea Electric 1994 = 116 UK = 99/00 = 71 ESAA = 189 APPA typically < 15 International best practice = 47
System average outage frequency index (SAIFI)	Minimize number of times supply is lost	1) Total number of customer interruptions 2) Average total number of customers	$\frac{\text{Total number of customer interruptions}}{\text{Average total number of customers}}$	Pacific avg = 20 Pacific best practice = 10 ESAA= 2.86 International best practice =0.9

KPI	Purpose of managing the indicator	Data Required	How Calculated	Suggested Benchmarks & Reference Values Pacific data 2000 & 2001 ESAA data 1999 APPA data: 2000 Other: as specified
Innovation & Staffing				
% revenue from new products	Translating innovation into commercial outcomes	1) New product/service revenue 2) Total revenue	Revenue from new product/service Total revenue	
% profit from new products	Translating innovation into commercial outcomes	1) New product/service profits 2) Total profits	Profits from new products/services Total profits	
Staff satisfaction	Gaining team support	Internal survey results	Survey results	Suggest comparison of results from year to year
Total lost time injuries duration (LTID)	Keep staff safe	1) Total staff days lost due to injuries 2) Total number of employees	Total days lost due to injuries Avg total number of employees Note: Pacific data so far calculated differently to international standards	ESAA Gen = 0.15 ESAA Trans = 0.10 ESAA Dist = 0.23
Lost Time Injury Frequency Rate LTIF)	Keep staff safe	1) Total number of lost time injuries 2) Total annual hours worked	Total number of lost time injuries per annum * 1,000,000 Total annual hours worked Note: Pacific data so far calculated differently from international standards	ESAA Gen = 8.26 ESAA Trans = 5.45 ESAA Dist = 8.07

KPI	Purpose of managing the indicator	Data Required	How Calculated	Suggested Benchmarks & Reference Values **Pacific data 2000 & 2001** **ESAA data 1999** **APPA data: 2000** **Other: as specified**
Lost Time Industrial Disputes	Promote co-operation and minimize disputation		Total days lost due to industrial disputation per annum Average total number of employees	ESAA median = 0
Finance				
Return on Equity	Achieve commercial returns	1) Net profit after tax 2) Equity	Common commercial standard: Net profit after tax Equity Pacific data returns calculated as follows: Operating income Avg fixed assets in operation	International power industry avg = 7% - 10% Best practice = 18% Results from 200 major companies* 1) US: 19% 2) UK 17% 3) Europe: 14% 4) Japan: 9% 5) Total: 16% *"Key Management Ratios" Ciaran Walsh Financial times- Prentice Hall 1996 Great Britain Pacific avg: minus 23.46%

Detailed Process Level Indicators

Detailed Process Measures



Used in conjunction with detailed, process level benchmarking

Following are more detailed Performance Indicators (PIs) In power utility process order

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
Strategic Management	Achieve strategic (Balanced Scorecard) goals	Effectiveness in strategic management	∑ % goal achieved * weighting	
Business Intelligence	Scan environment	Review threats and opportunities	Yes/no Input into strategic plan	>1pa
Financial management	Sales to fixed assets	To manage the balance sheet as well as profit and loss	Total sales Total assets (fixed and current) Not included in PPA benchmarking todate	Results from 200 major companies* 6) US: 3.8 7) UK 3.1 8) Europe: 4.3 9) Japan: 3.6 10) Total: 3.7% *"Key Management Ratios" Ciaran Walsh
	Interest cover	Indicator of financial strength	Profit before interest and tax (PBIT) Interest Not included in PPA benchmarking todate	Best practice: 5 *"Key Management Ratios" Ciaran Walsh
	Current ratio	Liquidity	Current assets Current liabilities	Pacific avg: 358% Pacific best practice: 100% International best practice: 100%

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
	Debtor days	Manage receivables	Accounts receivable * 365 Sales	Pacific avg=84 days Pacific best practice = < 50 days Results from 200 major companies* 11) US: 38 12) UK 39 13) Europe:82 14) Japan: 75 15) Total:62 *"Key Management Ratios" Ciaran Walsh
Governance				
Regulatory management				
Customer Relationship Management - Customer Service	Connections to existing supply:	Customer service management	% connected within 2 days of application	TNB Malaysia = 96%

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
	Connections new supply – low voltage, “normal” conditions	Ditto	% connected within 2 working days	TNB Malaysia 92%
	Connections new supply, low voltage, abnormal conditions		% connected within 2 weeks	TBN Malaysia 92%
	Breakdown reporting		% of customers given report numbers	TNB Malaysia 67%
	Restorations - Minor breakdowns		% restored < 4 hours	TNB Malaysia 95%
	Restorations - Major breakdowns		% restored < 2 days	TNB Malaysia 93%
	Reconnection after disconnection		% reconnected on same day of paying amounts due < 1pm	TNB Malaysia 98%

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
	Planned interruptions		% give > 24 hours notice	TNB Malaysia 77%
	Written complaints		% replied < 7 days	TNB Malaysia 93%
	Telephone complaints		Of complaints which could not be solved immediately, % recontacted < 24 hours	TNB Malaysia 84%
	Meter reading accuracy		% of determinations < 2 days	TNB Malaysia 94%
	Appointments with customers		% appointments on time	TNB Malaysia 92% (for appointments outside TNB offices)
Marketing Analysis, Marketing & Sales Channels	Marketing plan completed	Promote customer management	Plan Yes/no	
	Energy market share	Promote market management		

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
	Comparative prices	Promote competitive value	Comparative prices	Pacific typically = 16c/KWh Pacific avg = 13.66c/KWh Aust typically 7c USA typically: Residential 7c Commercial 6c Industrial 5c (All US$)
Revenue Management	% customers not billed	Collect all revenues due	Exception report from customer information system data base	One Island Utility is targeting < 0.05%
	Avg time to bill	Ditto	Time between meter reading and sending bill to customer.	< 3 working days
	Billing errors	Ditto	Dr and Cr adjustments to customer accounts Total value of billing for period	< 0.1%
Generation – Planning & Construction	Capacity factor	Effectively manage generation investment	Annual generation (MWh) * 100 Installed plant capacity (MW) * Period hours (8760)	Pacific avg = 34% Pacific best practice benchmark = >40% ESAA avg = 59.9% International best practice = 35%-65%

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
	Reserve plant margin	ditto	[Installed plant capacity (MW) – Peak Demand (MW)] * 100 Peak demand (MW)	Pacific avg: 111% ESAA = 17.4%
Generation Operations & maintenance	Labour productivity	Manage productivity	Electricity generated in period (GWh) Average number of generation employees *(excluding construction)*	Pacific avg 2.17 ESAA 22.4
	Specific fuel oil consumption	Efficiency	Units generated Fuel used Or Fuel used Units generated Fuel efficiency is measured in one of two ways: 1. Amount of fuel required to produce a unit of energy (kWh)/gm/KWh, gallonsKWh, litres/KWh; or 2. Amount of electrical energy (kWh) which can be produced from a unit amount of fuel, kWh/litre or gallon The determining factor on which expression is used is dictated by how the power utility purchases its fuel; ie: 1. By weight in tonnes 2. By volume in litres, US gallons or Imperial gallons	Pacific avg: 3.6kWh/litre Pacific best practice: 3 – 4 kWh/litre
	Lubricating oil consumption	Efficiency	Lubricants used Hours of operation	Pacific avg: 3.52 litres/hr Pacific best practice: 3.2 – 3.5 litres/hr

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
	Forced outage rate	Service level	MWh out of service due to forced outage * 100 Installed plant capacity (MW) * Period hrs (8760)	Pacific avg = 7.45% Pacific best practice benchmark = 0% ESAA 3.2%
	Planned outage rate	Service level	MWh out of service due to planned outage * 100 Installed plant capacity (MW) * Period hours (8760)	Pacific avg = 4.98% Pacific best practice benchmark = 3% ESAA 6.1%
	O&M costs/MWh	Efficiency	O&M costs Electricity sent out to grid (MWh)	Pacific avg = $36 Pacific best practice benchmark = $18
Transmission - Planning & Construction				
Transmission – Operations & Maintenance	Reliability	Manage outages	Unplanned outages * 100 Length of line	Pacific avg: 52.29
	Productivity	Control labour costs	Electricity delivered to transmission Number of transmission employees	ESAA; GWh delivered per employee: 75.5

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
	O&M costs per circuit km		O&M costs / Circuit KM	Pacific avg $2,263.57
Distribution Planning & Construction	Transformer utilisation ratio	Indicates system investment efficiency	Annual energy sales / Distribution transformer capacity (MVA) *8760)	Pacific avg = 18.02% Pacific best practice benchmark – 30% International practice = 50%
Distribution O & M	Customers per employee	Promote productivity	Average total number of customers / Average number of employees in distribution	Pacific avg: 232 Pacific best practice: 240 International practice: 350
	O&M costs/km	Promote efficiency	Distribution O & M costs / Total circuit kilometres	Pacific avg: 2,436 Pacific best practice: $800 International practice: $167
Energy Products and Services	Separately included to demonstrate that commercially developed utilities are separating Customer Relationship Management (CRM) from Electricity Sales as they become multi-product and service organizations. However, in the Pacific this has not yet developed and CRM and Energy sales are grouped together above.			
Business Support – HR	Staff training % payroll	Ensure adequate skills	Training costs / Total payroll costs	Pacific avg = 5.83%

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
Business Support Logistics/Supply Chain/Admin	Stock turns	Avoid excess stores holdings	Value of stores issued / Average value of stores	OK > 1 Good > 3
	No of times stores requisitions satisfied first time	Avoid stock outs	Value of stores requisitions satisfied first time / Value of stores requisitions	"Rule of thumb" for mainland power company 98.6% (ie body temperature)
Business Support IT	IT Plan support for Critical Success Factors	Ensure alignment	% alignment by assessment	100%
	IT plan Vs Actual	Effectiveness	% achievement by assessment	> 90%
	Help desk response times			
Business Support Treasury	Accuracy of cash forecasts	Promote accuracy in cash forecasting	Forecasts – Actual * 100 / Actual	
	Cash efficiency ratio	Minimize idle cash	Absolute value of periodic Dr and Cr bank balances / Annual revenue	Benchmark <0.01%
Business Support – Asset management	Included in generation, transmission and distribution			

Process areas	PI	Purpose of Managing the indicator	How Calculated	Reference value & Suggested Benchmarks
Business Support - Environment	No of reportable incidents	Minimize any detrimental environmental impacts		Zero