THE ASSESSMENT OF CURRENT VALUATION PRACTICES AS APPLIED TO LOCAL AUTHORITY INFRASTRUCTURAL ASSETS

SANDY BOND
University of North Florida

and

PORNSIRI SAKORNVANASAK
Thai Government

ABSTRACT

This paper outlines the results of a study using two postal surveys to determine the appropriateness and consistency of the valuation methods used in New Zealand by local governments for financial reporting on infrastructural assets. The focus is on those assets which are of a more non-market, public good nature. These assets, which are not commonly traded nor generate a definable income stream, give rise to the more complex valuation issues. The results of the first survey show that progress has been made towards accounting for, and valuation of, local authority infrastructural assets since a prior study by Bond (1996). However, the second survey results reveal that valuation approaches underlying the Optimised Depreciated Replacement Cost (ODRC) method are not being consistently applied.

Keywords: Public accountability, resource management, non-market, public sector assets, infrastructural assets

INTRODUCTION

The local government reform in New Zealand in the late 1980s gave rise to the need for greater accountability of resource use. Subsequently, there has been growing public concerns over how efficiently public resources are being managed and how reliably this is being reported. The appropriateness and consistency of infrastructural valuation in deriving a valuation figure for financial reporting purposes is of great importance to both local government and the public bodies they report to. The valuation figure in the financial reports is used by local government for the purpose of achieving efficient resource management and use.

This paper contains four sections. The first section provides a literature review and concludes by outlining the objectives of the current research. The second section presents the research methodology. In the third section, the research findings are discussed. The fourth section summarises the research findings. Finally, further research required on the ODRC approach are discussed, together with the areas that require cooperation and involvement from other interrelated disciplines to help improve infrastructural valuation.

As there is a world-wide move towards greater public accountability for government owned assets, coupled with the globalisation of the valuation profession and the methods they use, it is anticipated that this information will be useful to the International Assets Valuation Standards Committee (IAVSC) in helping to determine, and subsequently develop, the industry guidance that is needed to assist in improving infrastructural valuation practices.

LITERATURE REVIEW

Consistency in infrastructural asset valuations

The first priority for achieving active asset management and efficient resource use is the collection of relevant, reliable and full information about the asset portfolio. Without this, it is almost impossible to conduct an infrastructural valuation.

To investigate the consistency of current practices in the procedures and methods adopted by Local Authorities, and their employed valuers, in classifying, recording and valuing public assets, studies were conducted by Bond (1996) in New Zealand and Dent (1997) in the United Kingdom. The studies share similar results.

Each Local Authority generally adopted different recording procedures. Not all assets were recorded and some Local Authorities were not sure what assets were still owned or had been disposed of. The regularity of asset valuation and updates in the asset registers of Local Authorities varied widely. The main valuation problem experienced with the cost approach was in the estimation of expected useful life and the identification of the depreciation rate to apply to these assets. As a result, Bond and Dent (1998) recommend further studies to investigate the subsequent progress that has been made to the procedures and methods for recording and valuing infrastructure by Local Authorities.

Optimised Depreciated Replacement Cost Approach

The specialised and public good nature of many infrastructural assets pose limitations on the use of traditional valuation methods, such as market sales and income approaches, that are generally employed to value private sector assets. As these assets commonly have "limited marketability", a cost-based approach known as the Optimised Depreciated Replacement Cost (ODRC) approach is the most advocated method used to value infrastructural assets.[1]

In order for an appropriate infrastructural valuation methodology to be established in New Zealand, guidelines such as the Financial Reporting Standard No. 3 - Accounting for Property, Plant and Equipment (FRS-3) and the New Zealand Infrastructure Asset Valuation and Depreciation Guidelines (NZIAVDG) were introduced in 2001. Both are continuously being refined as a consequence of ongoing debates over the appropriateness of the valuation figures derived. However, the use of the ODRC method remains problematic due to a lack of specific guidance in its application.

There are various steps involved in the application of the ODRC method for valuing infrastructural assets. These include: defining the asset component level; estimating the replacement cost; defining the optimisation level; estimating both useful and remaining useful lives, and determining the decline in value. The definition of each step, and associated problems, are outlined below:

Defining the Asset Component Level

Componentisation refers to the component level at which assets are to be valued. FRS-3 stresses that components of infrastructure need to be presented separately if they are found to have different useful lives, and consequently different depreciation rates (National Asset Management Steering Group (NAMS) 2001, p.4.4). A significant issue is how the componentisation should work in practice, with little guidance being given (Auditor-General, 2004).

The component levels selected will influence the asset register breakdown that is used in the calculation of the total replacement cost (discussed below) by the valuer (NAMS, 2001). If this asset breakdown is not accurate or appropriate, the valuation will likewise be affected.

Estimating the Replacement Cost

According to the NZIAVDG (NAMS, 2001), the estimation of the replacement cost of an asset involves the calculation of the "gross replacement cost". Gross replacement cost refers to all current market costs associated directly in bringing the asset into its intended

[1] *While it is acknowledged that some infrastructure can be valued using traditional valuation methods, such as toll bridges and airports, the focus of this paper is on those assets that are not commonly traded nor generate a definable income due to their very specialised, public-good nature.*

working condition and use. The elements of gross replacement cost are: construction costs (e.g. material cost net of any discounts and recoverable taxes and installation costs); project overhead costs (e.g. architectural and engineering fees), and borrowing costs. Guidelines relating to the assessment of these costs are, however, broadly stated.

Regarding the total construction costs, they should reflect the charges based on local market cost information. Concerning the project overhead costs, they should be spread across all assets at a given percentage of the total construction costs (NAMS, 2001). However, there is no guidance over how the replacement cost of an asset, or groups of assets, under recent construction contracts (1-5 years), and those under prior years construction contracts (over 6 years) should be derived. This will affect the identification of the timing to be allowed before inflation is taken into account.

In addition, how valuers should deal with the borrowing costs is not addressed. The NZIAVDG merely refers to FRS-3 for its estimation, based on the average debt to equity ratio (NAMS, 2001). To address this deficiency, two types of interest rates for determining the borrowing costs were suggested by Dunlop (2003), a specialist in the valuation of wastewater systems. They include a risk-free government bond rate and a discount rate determined using Capital Asset Pricing Model (CAPM) theory. A lack of consensus amongst valuers in assessing borrowing costs indicates there is a need for future research and guidance of the correct approach to adopt.

Optimisation

Optimisation is the process of identifying a modern equivalent asset that can efficiently provide the same utility as the existing asset being valued, but at a lower cost. The incremental degrees of optimisation appropriate for infrastructural valuation, arranged from the lowest degree of optimisation but highest replacement value, respectively are: the reproduction of the existing asset; the elimination of surplus assets; the elimination of obsolescence; the elimination of over-design; site reconfiguration, and changed location (NAMS, 2001).

According to the NZIAVDG, optimisation should be done using a ‘bottom up’ approach at the asset level. However, the adoption of the modern equivalent asset at an appropriate degree of optimisation, if done using a ‘bottom up’ approach, would be time consuming and complicated. In general valuation practice, optimisation is based on a high asset component level in preference to a sub-asset component level (Dunlop, 2003). Alternatively, it is on a global optimisation basis whereby 20% or 30% optimisation is applied across an entire asset class (Auditor-General, 2004). However, even if optimisation is done based on the latter approach, the physical, legal and financial feasibility of the selected degree of optimisation used needs to be justified.

When determining optimisation, site reconfiguration is taken into account by some valuers. This is based on factors such as inefficient layout, higher maintenance costs, and lack of unity between structures. Yet, this is an inappropriate approach and is as a result of incorrect interpretation of the various valuation guidelines (Auditor-General, 2004).

Despite the significance of optimisation and the impact it may have on the replacement cost and the remaining useful life of the asset, no approaches to determine this have been specified in the NZIAVDG. Kellett (2002), a specialist in infrastructural valuations of water, drainage and roading assets, suggests that using a scaling factor is the only available approach to deal with surplus capacity.[2] It is applied when the cost of an asset with specific operational capacity is not available for comparison.

Estimation of Total and Remaining Useful Lives

According to the NZIAVDG (NAMS, 2001), the useful lives of infrastructural assets must be the minimum of either the physical life or the economic life. Physical life refers to the period of time an asset is able to provide a required level of service until it encounters physical deterioration and ceases to operate economically. Thus, physical life depends on the impact of the following technical factors on the asset's standard life: design standards, construction quality, material quality, physical deterioration, maintenance history, working environment and economic obsolescence (NAMS, 2001).[3] The physical life estimation represents the maximum possible useful life of the asset.

Economic life, on the other hand, refers to the period of time an asset is able to provide a required level of service before it ceases to operate economically due to changing economic circumstances. These circumstances may include changes in the level of demand for the asset, legislative changes, regulatory restrictions, technological advances, etc. These situations need to be taken into consideration as they may affect the replacement date and cost.

However, the NZIAVDG does not provide any detail about how an asset's standard life which is, in turn, the basis of establishing the base life of the asset, is determined.[4] If the asset's standard life and base life are not clearly established, the asset's useful life may be inaccurately assessed. The determination of the asset's physical life (as stated earlier)

---

[2] *A logarithmic relationship known as the six-tenths-factor rule is used to assess the cost of a unit with "X" times the capacity of another unit at a known cost and capacity, by calculating for the "$X^{0.6}$" times the known cost of the unit.*

[3] *Standard life refers to the life of a general asset established by reference to a relevant industry standard and the construction standard of an individual entity*

[4] *Base life refers to the life of a specific asset before its physical deterioration and economic obsolescence, which relate to age, utilisation, condition and performance, are taken into account*

merely accounts for factors relating to the construction standard of an individual entity's asset and do not relate to the current condition and performance of that asset.

Although Kellet (2002) acknowledges that the lack of guidance to the assessment of an assets standard asset life is a weakness, he suggests that an asset's useful life and remaining useful life can be determined using a combination of approaches from both guidelines. The NZIAMM recommends that an asset's useful life can be calculated using the Inland Revenue Department's (IRD) tax lives as a starting point. An industry adjustment factor is applied to the tax lives (representing the standard lives) in order to better reflect specific industry experience with the asset before the technical factors are considered, as suggested in the NZIAVDG, to arrive at the asset's base life.

To assess the remaining useful life of the asset based on its current condition and performance data the NZIAVDG recommends the use of predictive modelling. However, again the NZIAVDG lacks specific guidance on how this is to be applied in practice. Both the asset's current condition and performance data are highly dependent on the experience and cumulative data collected over time by the owner entity. Likewise, the predictive models that are used to derive the age, utilisation, condition-grading and performance-grading factors also require accumulation of actuarial evidence and/or engineering experience and judgement that is not always easy to obtain.[5]

In summary, the NZIAVDG provides a broad approach toward assessing an asset's total useful life and remaining useful life, but without specific guidance to aid in their assessment.

Determining the Decline in Value

The decline in value of an asset can be derived by applying the annual depreciation rate and age to the asset's total optimised replacement cost (ORC). The annual depreciation rate can be calculated by dividing the optimised replacement cost by an assessment of the asset's total useful life, as discussed above, and converting this annual amount to a percentage of the ORC. As a result, the optimised depreciated replacement cost of an asset depends on the earlier procedures of the ODRC method, outlined previously. If these are inaccurately assessed, so will be the ODRC.

Land Value

Once the ODRC of the asset or group of assets has been assessed, the figure needs to be added to the land value upon which the asset is built. FRS-3 requires land to be valued at

[5] *The condition-grading factor accounts for the reliability of the asset's structure based, for example, on construction methods. The performance-grading factor accounts for the impact on performance as a result of, for example, changes in operational or legal requirements.*

its market value in accordance with its use. Valuation practice also requires any adjustments to reflect land impediments. Restrictions must be reasonable and properly justified.

Problems in valuation arise when there are restrictions on the use and/or disposal. The approach adopted in the Treasury Guidance (May 2002, revised in March 2003) is that there needs to be an absolute restriction on the disposal for land to be given a nil value. However, how to deal with partial restrictions is not clear. Determining the actual nature of the interest in the land and what comprises "Highest and Best" use can also be problematic (Auditor-General, 2004).

Conclusion

The most advocated method to value infrastructural assets is the ODRC method (Bond, 1996). However, the literature review indicates that there is uncertainty over the correct approach to take in applying this method. This paper outlines a study of current practices in the valuation and reporting of infrastructural assets by local authorities for the preparation of financial reports.

RESEARCH METHODOLOGY

To help clarify the appropriateness and consistency of infrastructural valuation methods and reporting, two surveys were used. Firstly, a survey of New Zealand local authorities was conducted to determine the progress that has been made subsequent to the Bond (1996) study to the procedures and methods for recording and valuing infrastructure. Secondly, a survey of valuers was carried out to determine which approaches are being used, how they are being applied and what, if any, innovative approaches are being adopted that are more appropriate and lead to more consistent infrastructural valuation practices.

First Survey: A general survey on "Current Valuation Practices of Local Authority Infrastructural Assets"

To obtain the general practices used in the accounting for, and valuation of, infrastructural assets, a postal survey was developed and administered to all 74 Local Authorities (District Councils) throughout New Zealand as they are required by legislation to value public assets, which include infrastructure, to meet accrual accounting practices. A response rate of 42% was achieved. Reminder letters were sent out that helped achieve this favourable response rate.

The survey included general questions on asset recording: how fixed assets are classified; what proportion of different fixed asset classes are held in the Local Authorities' asset portfolio; how the asset register or database for infrastructural assets is prepared and how frequently it is revised. Questions focusing on asset valuations included: the frequency of revaluation; the purpose for which infrastructural valuation is undertaken; the identification of the valuer involved in infrastructural valuation; the current valuation guidelines adopted and the valuation methods employed. Finally, the Local Authorities were asked whether the valuation exercise performed has achieved the purpose for which it is undertaken and whether they have any additional concerns and comments about infrastructural valuation. The frequency and percent of responses to each question were calculated to allow for an overview of the Local Authorities' responses and to assess any differences in their responses. The results from this analysis are outlined in the next section.

While annual accounts for many local authorities had been collected in the Bond (1996) study to check the validity of the survey responses, this was not carried out for the current research due to time constraints.

Second Survey: A comprehensive survey on "Current Practices in the Valuation of a Local Authority Infrastructural Asset - A Wastewater Treatment Plant"

To obtain details of the valuation approaches currently employed by valuers, a specific infrastructural asset was adopted as a case-study to refer to in the survey. The asset selected was the Rosedale Wastewater Treatment Plant which is managed by the North Shore City Council (NSCC) and serves a population of approximately 200,000. This asset was selected as detailed information was available about this asset upon which to base the case-study. Further, it was envisaged that this type of asset may be one of the more complex assets to value.

The survey was designed according to the results obtained from the first survey and in particular, the problems encountered in performing the ODRC calculation. The first section of the survey comprised general questions relating to the utilisation of the ODRC approach, while the second section contained more specific questions on the ODRC approach as it relates to the valuation of the wastewater treatment plant.

Two versions of the survey were developed, one for in-house valuers, and the other for independent valuers. The in-house valuer version did not contain questions pertaining to the purpose for undertaking the valuation or questions relating to the guidelines and other alternative valuation methods used in performing infrastructural valuation, as these aspects had been addressed in the first survey to Local Authorities.

A total of 23 questionnaires were distributed by post; seven to in-house local authority valuers and sixteen to independent valuers (from valuation companies). The names of both the in-house and independent valuers were compiled from responses to the initial survey. After reminder phone calls were made, four of the in-house valuer surveys and four of the independent valuer surveys were returned (57% and 25% response rate, respectively). An overall response rate of 35% was achieved. The low independent valuer survey response rate may be due to a limited number of valuation firms actually being involved in this kind of work in New Zealand. Despite the low response rate, it still provides useful information that can help inform both valuers and the IAVSC.

For the second section of the questionnaire, only five responses were obtained (23% response rate). Therefore, the answers provide a limited, but still important, insight into the potential problems with infrastructural valuation and guidance provided.[6]

RESULTS

Results of the first survey

The essential findings of the first survey indicate that progress has been made since the Bond (1996) study towards greater consistency in the accounting for, and valuation of, Local Authority infrastructural assets. For example, more Local Authorities keep a record of assets owned now, (from 90% in 1996 to 100% in 2003) and infrastructural asset valuations are performed more regularly now compared to the 1996 study (90% versus 68% respectively).

Asset Recording

All of the respondents maintain a record of infrastructural assets owned in an asset register. Generally, most of the respondents (97%) make use of a computer database for recording infrastructural assets. Over two-thirds (71%) of the respondents use an Asset Information Management System (AIMS). All of the respondents update the information in the asset register, but the timeliness for doing so varies considerably. Most (97%) respondents update asset registers at least annually, with a move to a more "real-time" process.[7]

However, with the exception of infrastructure, the results indicate that not all Local Authorities classify assets in the same way. It is therefore apparent that clearer asset definitions are required to ensure more consistent asset classifications (and hence application of the correct valuation methods). Although infrastructure is correctly classified, there are a number of concerns regarding the current valuation methods used (to be discussed below).

---

[6] *A copy of the survey is available upon request from the lead author.*

[7] *A real-time update of asset registers is interpreted as meaning an ongoing, continuous process, anytime new information becomes available that may affect any of the assets*

Infrastructure remains the largest fixed asset in the Local Authorities' asset portfolio. This finding re-emphasises the importance of having appropriate and consistent valuation methods to derive infrastructural valuation figures for financial reporting purposes. The results indicate that Local Authorities hold 65% to 95% of their total asset portfolio in infrastructural assets (Local Authorities with smaller populations are at the higher end of this range). This may in part be due to the land areas of Local Authority with lower populations being relatively greater than that of Local Authorities with larger populations. Conversely, a greater proportion of property assets might possibly be required to serve a greater population density.

Asset Valuations

Nearly three quarters (73%) of the respondents revalue their asset only three-yearly, which does not correspond with the regularity of the asset register update, reported earlier. In general, most respondents indicated that they perform infrastructural valuation in accordance with the legislation.

The percentage of in-house valuers being employed has increased but, in relation to this, the valuations are all independently verified. Engineers appear to be the primary "other" personnel who assist in the infrastructural valuation. The dominant source of guidelines utilised by Local Authorities (by 84% of the respondents) in performing infrastructural valuations is FRS-3 from the accounting profession. However, as over two-thirds (71%) of the respondents to the first survey are from the Accounting Division, this may have influenced the responses to this question. As these respondents are not valuers, they may not have been aware of the availability of the New Zealand Property Institute and NAMS valuation standards and guidelines.

The replacement cost approach is the valuation methodology employed for infrastructural valuation. Most (94%) of the respondents indicate that ODRC is used, while the remaining 6% use only Depreciated Replacement Cost (DRC). The differences between these terms arise when the degrees of optimisation involved differ in each case. The degree of optimisation used will affect the estimation of the replacement cost and remaining useful life.

Determining the expected useful life of assets used by Local Authorities in the replacement cost approach was found to be problematic. There were wide variations in the expected useful life adopted by different Local Authorities for each infrastructural asset class. Two-thirds (67%) of the respondents implement predictive modelling in determining the asset's remaining useful life, but add that it might not be cost-effective if used with assets that have too long a life and are too new.

There were a number of concerns raised by the respondents. One respondent suggested that building a history of repairs and maintenance of the assets to improve the useful life estimations through methods, such as predictive modelling, takes time. The situation where infrastructural assets last longer than their expected useful lives was also raised as an issue as the depreciation may exceed the cost of the asset.

There was a suggestion for a return to a Historic Cost approach on the basis that the cost of compliance with the reporting standards, for which valuation is a part, is prohibitive. This cost factor is also compounded by the need to employ external valuers, due to their specialised knowledge in infrastructural valuation.

Additional concerns were raised over the componentisation of the assets during valuation. One respondent would like to see the valuation of each asset based on the same componentisation used by each council so that the valuation of the asset can be compared between councils.

Results of the second survey

Responses to the question pertaining to the purpose for which the valuation is undertaken confirm the results of the first survey, where all independent valuers perform infrastructural valuation primarily for the purpose of meeting legislative requirements. Only half of them value infrastructure for the purpose of asset management and insurance. However, as opposed to the first survey where the FRS-3 is regarded as the dominating source of valuation guidance (84%), the NZIAVDG appears to provide the most significant guidelines for independent valuers.

All independent valuers responded that the replacement cost approach remains the valuation method of choice for valuing infrastructural assets. Two respondents said that methods used to derive a valuation figure through comparison to recent market transactions of similar assets together with other market-based evidence (i.e. the discount rate), if available, are also utilised. However, the respondents indicated that they are unsure of the appropriateness of the valuation figures derived from such methods.

The results indicate that problems in valuing infrastructural assets using the ODRC method remain. A number of concerns were raised about the componentisation process. However, few suggestions were offered on the approaches to take in performing either the estimation of replacement cost, the optimisation process, or the estimation of remaining useful life. The findings to the second survey are outlined below according to the ODRC valuation method.

Defining the Asset Component Level

Local Authorities suggest that the valuation of an asset based on the same componentisation should be performed in order to allow for comparison of valuation figures between Local Authorities. Yet different component levels are being adopted in the asset registers. Naturally, valuers are concerned about this lack of a suitable asset register at the required asset component level to perform the valuation. A consensus on an appropriate level of componentisation should be reached between the valuers and the Local Authorities to aid the valuation task.

The reliability of a valuation at higher aggregated component levels compared to a detailed valuation at its lowest component levels is also debated, as the former is more time and cost-effective to produce, and hence is preferred.

Estimating the Replacement Cost

In relation to the derivation of the replacement cost of an asset, or groups of assets, under different construction periods and the timing allowed before inflation is, or can be, taken into account, the survey results suggest that the longer that construction takes to complete, the more that current costs of construction and project overhead costs are considered in estimating the replacement cost rather than the historical cost, or historical cost adjusted with a construction cost index. Approximately 88% of the respondents indicate that suppliers should be approached for determining both the current and most efficient materials, and costs for an asset, or groups of assets, under construction contracts from prior years (over six years). On the other hand, all respondents suggested that a construction cost index should be applied for recently constructed assets.

The results indicate that greater guidance is needed on how to take borrowing costs into account in the ODRC method. Respondents appear to have no knowledge of how to allow for this factor. Consensus regarding the inclusion or exclusion of borrowing costs, as well the method for deriving it, if included, needs to be reached.

Optimisation

While most respondents (88%) indicate that an optimisation process is used when determining the replacement cost of a wastewater treatment plant, surprisingly half of them indicate that the optimisation process is not required.

Respondents who use optimisation report that current technology and the service delivery level are the major determinants for which an optimisation level is required. The relevant degrees of optimisation suggested by the respondents are: the elimination of surplus assets; obsolescence, and over-design. Yet, there is no suggestion on how optimisation should be done under the required optimisation levels. Unfortunately, the respondents provide no feedback on the precise source of the difficulties experienced in applying the incremental degrees of optimisation in deriving the optimised replacement cost. Regardless, the results indicate that more guidance is needed on the optimisation process to clarify some of the issues.

Estimating Total and Remaining Useful Lives

The results indicate that the engineer is the main source of information relied upon by all respondents in determining the asset's useful life. An engineer's knowledge and experience about an asset's useful life is believed to be as reliable as the base life derived from a systematic calculation (as suggested by the NZIAMM).

Only 38% of the respondents indicated that the condition-based depreciation method is used to derive the asset's remaining useful life. This method uses the assessment of the asset's age, utilisation, condition or performance and does not rely on the collection of detailed information over time about the asset. However, a respondent suggested that the condition-based depreciation method is gaining momentum as the common approach.

Predictive modelling based on the NZIAVDG and the NZIAMM was used in determining the remaining useful life by 67% and 50% of the respondents respectively. However, few details of how to determine the remaining useful life based on a provided condition and data confidence rating were provided. Many of the respondents (83%) emphasised that condition/performance monitoring is required to help ensure that condition/performance grading is appropriate. This is to help improve the reliability of the assessment data and confidence ratings, thus improving the accuracy of the asset's useful and remaining lives estimations. Reliability of data remains a major issue in these assessments and greater guidance on how to deal with this should be provided.

If details on the condition/performance assessment are not available to determine the appropriate remaining useful life, 71% of the respondents suggested that the sample listings of useful lives from NZIAVDG be used as the basis/guideline. The actual age, input from engineers and experience in the field were also suggested as being used in determining the remaining useful life. All these methods were employed in the valuation case study. All respondents rely on the New Zealand Infrastructure Asset Guidelines as the basis for condition/performance rating systems.

Lastly, the respondents appear to understand the impact of a decommissioning plan of an asset on its remaining useful life and value. They realised that the remaining useful life and value of the affected asset depend on its use after decommissioning. They suggest that there will be no remaining useful life unless the asset goes into service at the plant for another function/purpose, say, for example, as backup.

SUMMARY

In summary, although the results of the first survey revealed that progress has been made towards greater appropriateness and consistency in the accounting for Local Authority infrastructural assets since the Bond (1996) study, the results of the second survey revealed that valuation approaches underlying the most advocated valuation approach, the ODRC method, are not consistent in deriving an appropriate value figure for financial reporting purposes. These inconsistencies are in terms of the componentisation level used in the valuation and the application of the appropriate approaches required to derive the replacement cost, optimised figures, remaining useful lives and depreciation rates, all of which are the main elements of the ODRC method.

These inconsistencies need to be dealt with in a coordinated fashion by related professions. Further, it became apparent that further research, initiatives and guidelines are required in order to appropriately perform infrastructural valuation. These are outlined in the next section.

FURTHER RESEARCH

Further research and guidance is needed to help improve the appropriateness and consistency of infrastructural valuation used for financial reporting purposes. The following headings outline the areas that need particular attention.

Estimation of borrowing costs

Future research should be directed at establishing an appropriate approach for deriving the borrowing cost. Consensus is needed regarding the basis for the borrowing cost calculation (i.e. the rate to be used whether it is derived from the discount rate based on the CAPM, or the risk-free rate) and the inclusion/exclusion of the borrowing cost in deriving the replacement cost. This would achieve greater valuation consistency.

Estimation of optimisation

There are no specific approaches suggested in the NZIAVDG of how the optimised replacement cost should be determined. This is despite the significance of optimisation and the impact it may have on the replacement cost and the remaining useful life of the asset. Research is needed to identify the precise source of difficulties experienced by valuers in applying the incremental degrees of optimisation for deriving the optimised replacement cost so that these can be adequately addressed.

Estimation of total useful life and remaining useful life

Clearer guidance is needed to address existing uncertainties on the approaches to be adopted for determining the total and remaining useful lives. In particular, guidance is needed on the basis to be used for establishing the base life of an asset and how to apply predictive modelling where sufficient asset information is available to apply this approach. Guidance is also needed on how to deal with the possible problems relating to the reliability of the assessment data and the data confidence rating.

In conclusion, in order that appropriate approaches are adopted in performing infrastructural valuation, consensus regarding the appropriate level of componentisation, the inclusion/exclusion of the borrowing costs and how these are calculated must be reached within the valuation profession. Further, consensus is needed regarding: the optimisation approach to be used and how it is to be applied; the basis for establishing the base life; how predictive modelling is to be used, and how to deal with data reliability. Once these issues are resolved, the resulting infrastructural valuation figures reported in the financial statements will more accurately reflect the public sector's infrastructural resource use.

REFERENCES

Auditor-General (2004). "FRS-3 Lessons Learnt – Information Memorandum", [Online]. E-mail available s.bond@auckland.ac.nz [2004, August 23].

Bond, S.G., (1996), "The valuation of local authority assets: identifying the appropriate methodology", *New Zealand Valuers' Journal*, November, 49-63.

Bond, S.G. and Dent, P. (1998), "Efficient management of public sector assets: the call for correct evaluation criteria and techniques", *Journal of Property Valuation & Investment,* Vol. 16, No. 4, pp. 369-385.

Dent, P. (1997), "Managing public sector property assets: the valuation issues", *Property Management,* Vol.15, No. 4, pp.226.

Dunlop, S. (2003), "Recap of last Friday's discussion", [Online]. E-mail Available psak003@ec.auckland.ac.nz [2003, March 18].

Institute of Chartered Accountants of New Zealand (ICANZ), (2002), *Financial Reporting Standard No. 3 - Accounting for Property, Plant and Equipment (FRS-3),* Wellington: Institute of Chartered Accountants of New Zealand.

Kellet, B. (2002). Plant and Machinery lecture series, Department of Property, The University of Auckland.

Local Government New Zealand. (2002), "Land areas for local authorities", [Online]. Available from: http://www.lgnz.co.nz/localgovt/lgfacts/faq/landarea.html [Accessed 2003, March 7].

New Zealand Institute of Valuers (1995), Valuation Standards, Wellington: New Zealand Institute of Valuers.

New Zealand Property Institute (2002), Valuation Standards, Wellington: New Zealand Property Institute.

Mair, R. (2002), Statistics New Zealand, "Groupings of urban areas", [Online], E-mail Available: psak003@ec.auckland.ac.nz.

McClave, J.T., Benson, P.G. and Sincich, T., (1998). *Statistics for business and economics.* 7th ed. Upper Saddle River: Prentice-Hall, Inc.

New Zealand National Asset Management Steering (NAMS) Group, (1998), *New Zealand infrastructure asset management manual. 1.1 ed.*, Wellington: New Zealand National Asset Management Steering Group.

New Zealand National Asset Management Steering (NAMS) Group, (2001), *New Zealand infrastructure asset valuation and depreciation guidelines,* Wellington: New Zealand National Asset Management Steering Group.

North Shore City Council, (2002), *Wastewater treatment plant asset management plan version C revised final May 2002.*

Peters, M. S. and Timmerhaus K. D. (1980), *Plant design and economics for chemical engineers.* 3rd ed., New York: McGraw-Hill.

Statistics New Zealand (2002a), "The territorial authority by census night population count and rank, 1991, 1996 and 2001", [Online]. Available: http://www.stats.govt.nz/domino/external/pasfull/pasfull.nsf/0/4c2567ef00247c6acc256bc600095eed/$FILE/Table%204.xls [Accessed 2002, August 7].

Statistics New Zealand. (2002b). "Glossary term: rural areas", [Online]. Available from: http://www.stats.govt.nz/domino/external/omni/omni.nsf/23f076d733ded7e74c256570001d92b4/6d7bb4fa17674963cc2569030012acbe?OpenDocument [Accessed 2002 August 7].

Statistics New Zealand. (2002c). "Glossary term: urban areas", [Online]. Available: http://www.stats.govt.nz/domino/external/omni/omni.nsf/23f076d733ded7e74c256570001d92b4/2d15e04a89307212cc2569030012ac4e?OpenDocument, [Accessed 2002, August 7].