Technical note

Evaluation of an integrated asset life-cycle management (ALCM) model and assessment of practices in the water utility sector

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Abstract

The water utility sector in South Africa is presently facing numerous challenges. Amongst the most urgent and important priorities is ageing infrastructure, which has the potential to end in failures with detrimental impacts on local communities and the natural environment. Furthermore, to manage the majority of strategic assets in terms of total performance, i.e. environmental, financial, social and technical, is often difficult as a large portion of assets, such as buried pipelines, cannot be easily accessed. These issues highlight the need for a generic asset life-cycle management model for the water utility sector. Such an integrated model is introduced; it was evaluated in the largest water utility in South Africa. Although it was found to have relevance, practicability, applicability, and usability, the model still needs rigorous testing amongst other water utilities in South Africa, and in other countries. The perceptions of the water utility sector were also assessed in terms of the practices of the principles of integrated life-cycle asset management. The results indicate a fairly good understanding of the concept of asset life-cycle management, but adhere to challenges with fully implementing all the principles when it comes to asset performance measurements; particular attention must be given to develop mechanisms to measure environmental and social aspects. Nevertheless, it is highlighted that for strategic assets, the practices and principles of ALCM have many benefits, including better maintenance management, infrastructural planning, risk management, and sustainable development.

Keywords: life-cycle management, asset management, sustainable development, South Africa

Introduction

The water utility sector in South Africa is presently facing numerous challenges. Amongst the most urgent and important priorities is ageing infrastructure that must be replaced (Schwellnus, 2005), and the previous lack of formal knowledge management systems prior to modernisation in the later part of the 1980s (Rand Water, 2004). In terms of the latter the consequence has been a gross underestimation of the total value of physical assets under the control of organisations in the water utility sector in the first instance. Secondly, this caused a very reactive approach to asset replacement as the exact location and condition of the assets, especially buried pipelines, was not fully known. While there is available technology, such as eddy current scanning, that can detect pipe leaks for example, there is no technology that can detect impending leaks. Thirdly, because the landscape, i.e. natural environmental factors, and communities, i.e. social factors, around the infrastructure often change significantly from the time of the initial installation of infrastructure, the potential impacts on the communities and the natural environment in the event of failures of assets is a considerable risk, which increases each year.

Schwellnus (2005) emphasises that factors, other than financial, increasingly need to be considered in making decisions, including risks to current operations. Furthermore, the status of the large majority of strategic assets is often unknown in terms of total environmental, financial, social and technical performances, which are subsequently not addressed adequately in most asset management practices (Botha and Brent, 2005). These parameters impact the triple bottom line of an organisation, and need to be actively managed to ensure sustainable growth of the company into the future (UNEP, 2006). To this end some asset management approaches do have a total life-cycle process perspective, i.e. the ‘cradle to grave’ principle (Schuman and Brent, 2005). However, the ‘triple bottom line’ must further be contextualised within the life cycle and value chain concept of the product, namely potable water, from extraction and purification to distribution to the end users (Landu and Brent, 2006). The whole-system value chain must be scrutinised in view of the fact that the water utility sector is a key driver in enhancing socio-economic growth within South Africa, and in all countries.

Objectives of the paper

The aforementioned challenges that are posed by intense pressures from stakeholders, together with legislation such as the Public Finance Management Act (PFMA) and the Municipal Finance Management Act, are giving impetus to the concept of integrated asset life-cycle management (ALCM) in the water utility sector. This paper introduces such an integrated ALCM model, conceptualised for physical and strategic assets in the water utility sector of South Africa. The paper then summarises the evaluation of the model in the largest water utility of South Africa, and further assesses the current status in the water utility sector, in general, as to the practices of the principles of integrated ALCM.