



Challenges and prospects of applying asset management principles to highway maintenance: A case study of the UK



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ABSTRACT

Past models and tools that support in the decision making process based on Asset Management Principles (AMP) are lacking in terms of the effective outcomes and transparency of the process in the highway maintenance. There is also little research on how to align the decision areas when applying AMP and how to improve the inclusive effectiveness. Hence, the paper focuses on examining the challenges and prospects of applying AMP in a highway maintenance agency or department. An exploratory research method was used through an extensive review of literature and an industry survey. The findings from the literature and case study review were used to design a questionnaire and conduct the survey. The survey results revealed that the AMP are only being implemented ineffectively in maintaining highways, and a strong commitment is required to improve the asset management capability for effective use of the asset data. It is highly recommended that the Highway Agency should issue a guideline for implementing asset management policy and also encourage associate departments to achieve asset management maturity level 3 so that ISO55000 certification can be achieved. The study concludes that there is still substantial work needed within the asset management process, particularly in highway maintenance before its effectiveness can be realised and measured.

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1. Introduction

Highway infrastructures are the largest, most valuable, and visible assets, which are owned by the public in the UK. ISO55000 is an international standard, which covers the management of physical assets. According to ISO55000, assets are something with potential value to an organisation and for which the organisation has a responsibility. However, asset management covers the whole lifecycle of the physical assets, which include construction, maintenance and disposal. It is a well-established and executed discipline in the UK and internationally, for the management of physical assets according to a report published by the UK Highway Agency (HA, 2015). The report highlights that the adaptation of asset management principles demonstrates the benefits in terms of financial efficiencies, improved accountability of the assets, better value for money and enhanced customer services. However, there are significant challenges in managing the highway assets. Satisfying the growing expectations of the public for accessibility and eagerness of the highway networks, reliability of journey times, increasing scrutiny, transparency, accountability and media exposure while delivering the legal obligations, and maintaining the engineering integrity of the highway networks are examples of key challenges. Managing the impact of traffic growth under huge financial constraints with a clear message of “more for less”, and “making the most of what you have”

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is causing extra pressure on the use of existing physical infrastructure assets (HA, 2015). It is therefore essential to investigate the challenges and prospects of implementing the Asset Management Principles (AMP) within the highway infrastructure, particularly during the maintenance period so that the benefits from the AMP could be realised and achieved.

Previous studies have produced several asset management models and tools to support the decision making process of public organisations when adopting the asset management principles but there is still little understanding on how to align the decision process in the asset management and to improve its effectiveness. This study is based on the comprehensive analysis of existing literature relating to highway asset management principles with the aim of exploring how the UK Highway agency is responding to the challenges through the implementation of asset management principles against its reduced budget, and under different constraints. This paper outlines the public policies relating to asset management principles through an extensive literature review. Evaluation of a case study and the results of an industry based questionnaire survey, are discussed and recommendations for possible methods on implementing AMP more effectively into the Highway Maintenance sector are identified.

2. Literature review

2.1. Asset management

Asset management enables the realisation of values from the physical assets (ISO55000). It is a complex paradigm, requiring stakeholder's consensus on the values, policies, strategies and tactics, which are related to the infrastructure services, performance metrics, and associated management trade-offs (Spatari and Aktan, 2013). Van der Velde et al. (2013) pointed out that asset management is the profession of balancing cost, performance and risk over the life cycle of an asset. However, the Institute of Asset Management (IAM) defines asset management as "the coordinated activities of an organisation to realise values from the controlled assets". This definition is expanded further as a discipline wherein an organisation can use its principles and concepts to raise the value of the assets by balancing costs, opportunities and risks against the desired performance of the assets (IAM, 2012). Asset management has been practiced for thousands of years and researched for decades, however, there is no common understanding of what it is (Scharven et al., 2011). Consequently, asset management is a relatively emergent discipline and there is limited literature, particularly in relation to transport infrastructures.

In the UK, the owners of transport infrastructures such as Highways Agency (HA), Local Authorities (LA), Network Rail (NR), and the Canal and River Trust (CRT) all have introduced asset management policies. For the Highway Agency and Local Authority highway departments, this has become more significant and valuable due to the recent times of austerity and the deteriorating conditions of the highway assets in the UK. The highway asset is the most valuable publicly owned asset (UK RLG, 2013). The majority of the population use the road networks daily so it is of huge importance to the economic, social and environmental wellbeing of the community and businesses (Kendrick and Taggart, 2006). Hence, it is crucial that the highway assets need to be maintained effectively to ensure that they are kept in a safe condition for all who use them while working under several financial constraints and reduced maintenance budgets. To address the above challenges, the Department for Transport (DfT) stressed to enhance its capability of managing the assets and necessary skills so that DfT may be enriched itself as a high performing asset management organisation.

According to Davis (2015), a key principle in asset management is a line of sight, which means an approach within an organisation that looks to line up the work that is done directly on assets with the objectives of the organisation. Moreover, it is a discipline that recognises and aligns the risk of owning and operating a particular asset to fulfil the aims of the organisation that operates the assets management. The principles of asset management derive from the practical experience and reasoning, and aid to inform both strategic asset management and its practical applications to the life-cycle of the asset. These principles are asset acquisition, disposal and life-cycle management decisions, which are integrated into an entity's strategic and organisational planning. Furthermore, asset planning decisions are based on the evaluation of alternatives, which measures risks and benefits, and applies the public's core procurement principle of 'value for money across the asset's life-cycle'.

2.2. Asset management in infrastructure

Due to the economic crisis in 2008, many agencies and local councils were under huge pressure to satisfy expectations of the public in terms of reliability, safety and availability of the infrastructure networks under reduced financial constraints (Arts et al., 2008). Asset management has emerged as an approach which can help to achieve more value with fewer resources (Moon et al., 2009). The performance of public infrastructures has a strong influence on the economic viability and social development of nations (Scharven et al., 2011). To overcome these issues, the agencies are seeking new actions and processes to manage their physical assets more effectively and efficiently.

Moreover, Too et al. (2006) scrutinised some of the current asset management practice by government agencies in Australia and found that these agencies used a strategic approach despite the different frameworks adopted in practice. Later research suggested that organisations responsible for the management of infrastructure assets have to satisfy the needs and conflicting demands of the various stakeholders (Too, 2012). On one side, the public expect high quality of service and continuously improvement of the infrastructures. While on the other side the asset owners or regulators, often the government, want to limit the spending on infrastructure maintenance costs by introducing new regulations while also

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