Chapter 7
Information Quality Assessment for Asset Management Systems

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ABSTRACT

Information quality is critical for any business. It is particularly important for mission critical information systems that manage the lifecycle of an engineering asset. Quality of information or lack thereof in these systems can be traced to technical, organisation, as well as human sources. It is, therefore, extremely important to ascertain the causes that contribute to lack of information quality in asset lifecycle management systems. Depending upon the business area, organisations take proactive or reactive approach to establishing, maintaining, and enhancing their information quality. Among proactive approaches, the ability of the organisation to measure information quality dimensions forms the foundation of a solid information quality management initiative. Such a measurement, however, is an intricate task because these dimensions are subjective, can be context dependent as well as independent, and are interdependent, since each dimension impacts other dimensions. This research employs productive perspective to information and applies Six-Sigma methodology to assess its quality in information systems utilised to manage engineering asset lifecycle. It utilises analytical hierarchy process and quality function deployment to convert subjective information quality dimension into objective metrics, assesses the relationship between various information quality dimensions, and ascertains critical to quality factors. The results thus obtained form the basis for monitoring of information quality aimed at its continuous improvement. This study contributes to literature and practice by providing a method for assessing correlation of information quality dimensions, applying six sigma to information, and controlling quality of information.

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INTRODUCTION

Contemporary businesses are capturing, processing, and storing more than information than ever before. However, enormity of information is not of much use, if it does not conform to high standards of quality. Businesses are information driven and their competitiveness and profitability depends upon the quality of information available to their decision makers and knowledge workers. Engineering Asset managing organisations are no exception, and are dependent upon the information and its quality to institute effective planning, control, and management of their Asset base. However, a fundamental issue with ensuring information quality (IQ) is that it is hard to determine the quality of information while it is being captured and processed. It is only when it is being acted upon that an informed judgment can be made about its quality. The degree of quality of information is further subjected to the bias of its stakeholders. It is due to the same complexity that research and practice is replete with IQ assessment frameworks; whereas each of them serves specific industries, contexts, and objectives.

IQ has many dimensions and each dimension has a positive or negative correlation with other dimensions. These dimensions form the basic building block of IQ. IQ dimensions are a set of IQ attributes that reflect a single aspect or combined aspects of IQ (Stvilia, Gasser, Twidale, & Smith, 2007). Therefore, IQ dimensions can be used to interpret the degree of quality of information in quantitative terms as well as qualitative descriptors. Nevertheless, understating how each IQ dimension works and how it affects other IQ dimension is critical for IQ assessment and management. This paper proposes a methodology to assess how IQ can be measured by tracing the root cause of poor information in IQ dimensions as well as their correlation.

This paper begins with an analysis of information in Asset management paradigm. The paper then explains a Six-Sigma based IQ measurement and management framework based on productive perspective of information. The next section applies the framework in an Asset managing organisation and explains the process of converting information stakeholders' responses to objective measurements relating to IQ dimensions; using analytical hierarchy process (AHP) to establish the degree of relationship; and using quality function deployment (QFD) to extract the critical to quality (CTQ) factors precisely and logically. The paper concludes with a discussion of this research's potential value.

ASSET MANAGEMENT

The term Asset in engineering organisations is taken as the physical component of a manufacturing, production or service facility, which has value, enables services to be provided, and has an economic life greater than twelve months (Haider, 2011), such as manufacturing plants, roads, bridges, railway carriages, aircrafts, water pumps, and oil and gas rigs. The scope of Asset management activities extends from establishment of an Asset management policy and identification of service level targets according to the expectation of stakeholder and regulatory/legal requirements, to the daily operation of Assets aimed at meeting the defined levels of service. Asset managing organisations, therefore, are required to cope with the wide range of changes in the business environment; continuously reconfigure manufacturing resources so as to perform at accepted levels of service; and be able to adjust themselves to change with modest consequences on time, effort, cost, and performance.

Asset management can be classified into three levels, i.e. strategic, tactical, and operational (Figure 1). Strategic level is concerned with understanding the needs of stakeholders and market trends, and linking of the requirements thus generated to the optimum tactical and operational activities. Operational and tactical levels