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The Design of a Semantics-Oriented Organisational Performance Measurement System

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Abstract: Current methods and techniques used in designing organisational performance measurement systems do not consider the multiple aspects of business processes or the semantics of data generated during the lifecycle of a product. In this paper, we propose an organisational performance measurement systems design model that is based on the semantics of an organisation, business process and products lifecycle. Organisational performance measurement is examined from academic and practice disciplines. The multi-discipline approach is used as a research tool to explore the weaknesses of current models that are used to design organisational performance measurement systems. This helped in identifying the gaps in research and practice concerning the issues and challenges in designing information systems for measuring the performance of an organisation. The knowledge sources investigated include on-going and completed research project reports; scientific and management literature; and practitioners' magazines.

1 INTRODUCTION

Organisational performance measurement (OPM) systems are largely designed with consideration for fragmented sets of performance metrics based on functional and divisional boundaries of the organisation. This has resulted in implementations of OPM systems that are contributing to a situation in most organisations, whereby information relating to performance metrics are manipulated (Demski, 1998, Kahn et al., 2002, Lord and Maher, 1994, DeAngelo, 1988) at various levels of organisational management. The net effect of this on an organisation, is the existence of multiple and inconsistent versions of factual information in the same organisational performance context. These lead to multiple interpretations or misinterpretations of performance metrics for an organisation. In most cases, these create a false perception of how an organisation has performed to different stakeholder groups. A research conducted by (Fisher and Downes, 2008) summarised the various levels of deception that might be used by managers in UK public sector to "manipulate the information that is used to assess" organisational performance. This

problem is neither limited to UK public sector organisations nor was the problem of yesterday. It is rather, widespread in today's public and private sector organisations worldwide. Performance in organisations today is measured at the organisational units' level and then aggregated up the different levels of management.

Performance metrics are normally prepared for the heads of each organisational unit, who could massage the data to present results that reflect their view of the organisational unit before submission to upper levels management. Senior management can also massage the data to present results that reflect their view of the organisation. Thus, a large proportion of organisational performance metrics do not accurately reflect on the multiple aspects of semantics and business processes involved in the products lifecycle. For example, HR managers are concerned with the performance of the workforce and as such will concentrate on the measurement of workforce performance. Likewise, finance managers are concerned with the financial performance of the organisations and although may appear to consider non-financial performance metrics, are largely only interested in financial performance metrics. The managers of functional or divisional units mostly are

concerned with the performance metrics that affect the functional or divisional area of operation.

Design of OPM systems are largely focused on organisational structure, rather than domain semantics of business processes involved in the lifecycle of products or services that generate revenue for the organisation. The problems and challenges with this approach are many, and present real difficulties to organisations of all shapes and sizes. We believe the lack of consideration for semantics is due to the fact that research and practice in the area of OPM systems design, are largely focused on organisational structure with little or no consideration for semantics. In this paper, we propose a model for a semantic-oriented approach to OPM systems design. The model applies the concepts from organisational semiotics (semantics), business process management and product-based planning technique described in the PRINCE2 project management methodology. It suggests an approach to OPM systems design, whereby consideration is given to the inputs and outputs of business processes for performance metrics relating to business process efficiency.

2 PERFORMANCE MEASUREMENT, SEMANTICS AND PRODUCTS LIFECYCLE

OPM is defined widely from different academic and practice disciplines in a number of literature. Two definitions from the CIMA Official Terminology and the Interoperability Clearinghouse Glossary of Terms are used to express the concept in relation to this paper. OPM is defined as "process of assessing the proficiency with which a reporting entity succeeds, by the economic acquisition of resources and their efficient and effective deployment, in achieving its objectives." (CIMA, 2005). It is also defined as the "process of developing measurable indicators that can be systematically tracked to assess progress made in achieving predetermined goals and using such indicators to assess progress in achieving these goals." (Clearinghouse, 2005). A recent research conducted by Cranfield School of Management (Performance, 2009), describes the multidisciplinary nature of OPM and identified it as a field of study that has "developed from diverse origins". These diversities stem from research and practice into organisational management, which have mainly been focused on the measurement and control of functional and divisional units. As a result, measurement techniques, models and approaches have been developed based on organisational functional and divisional structures as opposed to semantics, business processes and product lifecycle.

Balanced Scorecard developed by Kaplan and Norton (1992), is an OPM framework that advocates development of organisational performance metrics considers four different perspectives with a focus on vision and strategy. These are customer, learning and growth, financial and internal business processes. During an enterprise decision making process, it enable as Kaplan and Norton (1992) explained, organisations to obtain answers to four basic questions, which are "How do customers see us?", "What must we excel at?", "Can we continue to improve and create value?" and "How do we look to Shareholders?". Parmenter (2009) enhanced the original balanced scorecard model with the addition of "environment/community" and "employee satisfaction" perspectives. The two additional basic questions that these two perspectives enables organisations to obtain metrics relating to questions such as, "How do employees see us?" and "How do we look to the external environment and communities?" These six perspectives of balanced scorecard present a performance measurement model that enable organisations to achieve what Hopper et al. (2007) described as the translation of "vision and strategy into measurable objectives with a practical meaning for management". Organisational vision and strategy is achieved by completing complex combinations sets of business processes, which can be translated into measurable objectives via the inputs and outputs of such business processes.

Smith (2005) observed a growing trend, whereby in recent years, organisations have been focusing on "fundamental concept as old as management theory itself, the humble, but mighty, business processes" to improve performance. Business processes are set of activities that cut across the major functional or divisional organisational boundaries and describe the way by which organisations accomplish their missions (Beynon-Davies, 2002; Davenport and Short, 2003; Daft, 2009; Laudon et al., 2011). A business process may include activities that only occur within a particular organisational unit or those that occur within and across organisations. Liu (2002) describes a business process as "a type of social interaction where material and communication acts are performed." From a semiotics perspective, these 'material and communication acts' are sign based

activities, each of which include the sign, it's meaning and purposeful use. Signs can be in "the form of words, image, sounds, gestures, and objects" (Chandler, 2007). Words, images, sounds, gestures, and objects are the raw materials of information that communicate metrics that depict the performance of an organisation.

Semiotics, a "doctrine of sign, draws from many disciplines to throw light on the ways in which people use signs for all kinds of purposes" (Liu, 2000). An organisation as a sign system, is comprised of, "a collection of signs used by some social group" (Beynon-Davies, 2002). From this perspective, an organisation represents the arrangement of users, data, business processes and technology that interact to achieve intended aims and specified objectives. Developing performance metrics for an organisation requires understanding of 'human information functions' of the organisation (Gazendam, 2004; Stamper, 1973). The semantics of performance metrics are embedded in the lifecycle of products produced by the organisation. Products in this sense, is used to represent a physical product or service as it is described by PRINCE2 product-based technique that allows "a focus on the products to be delivered and their quality" (Commerce, 2005). Design of systems to support implementation of these performance metrics and measure, on the other hand requires an understanding of 'the systems platform' as describe in the organisational semiotics ladder (Stamper, 1973).

3 SEMANTICS-ORIENTED OPM SYSTEMS DESIGN

One way of measuring organisational performance is by measuring the means by an organisation achieves its aims and objectives. Every organisation exists to produce some products, whether those products are physical products or services. An organisation can be measured by the products it produces, which represents the outputs of that organisation. These products may have various impacts on the organisation and its environments, which could result to a number of possible outcomes. Production of outputs involves inputs from the environment, which among other things include materials and efforts. Internally, an organisation employs a number of business processes during the lifecycle of a product. A product represent a means by which an organisation achieves it vision and strategy. The outcomes of a product are realised at various stages of its product's lifecycle and value chain. The

semantics of information generated during a product's lifecycle and value chain are "preoccupied with issues related to meanings, propositions, validity, truth, signification and denotation" (Liu, 2002). Performance metrics can be developed for each product broken-down into the business processes involved its lifecycle. Since semantics deals with meaning, performance metrics will reflect the different levels of outputs for business processes, products and organisation. Also reflected are the inputs that go into production of these products and the resulting impact of those products on the organisation and its environment (outcomes).

For the design of an OPM system, we propose use of a semantics-oriented organisational performance measurement (SOOP) systems design model, which seek to support measurement of outputs and outcomes that relate to sets of inputs and business processes (see figure 1). The emphasis of design is based on measurement of facts with context at three levels, which are: organisational, product and business process. The performance of a specific business process can be measured by measuring its efficiency, which is achievable by comparing the business process outputs (BPO) against the business process outputs (BPI). This can be expressed in mathematical terms as a ratio: BPO / BPI. A product represents outputs from a set of business processes whether a physical product or service. The product level considers measurements of facts about outputs and outcomes from a product lifecycle and value chain perspectives. Performance metrics for a product can be designed based on all business processes that convert a set of inputs into outputs and outcomes during the lifecycle of that product. The organisational level considers measurements of facts and context relating to management and governance. The efficiency of an organisation can be measured by comparing the total outputs (TO) from all business processes against the total inputs (TI). This can be expressed in mathematical terms as a ratio: TO / TI. The effectiveness of an organisation is measured by calculating the summation of performance metrics relating to outputs and outcome for all products.

Semantics of performance metrics are embedded into measurable facts and context. Measurable facts are made up of inputs, outputs, outcomes and their related ratios, which could be either financial or non-financial. Context can be categorised into product lifecycle and value chain, organisational management and governance, and the environment and relationships with which the organisation operate. The semantics of performance metrics thus reflect the combine sets of inputs, business process, outputs and outcomes in the

context of business process, product and organisation. SOOP systems design model does not focus on individual organisational units, whether functional or divisional. The focus is rather on measurement of facts with context relating to business processes, products, organisation and its environment. The SOOP systems design model presents opportunity for implementation of OPM systems that support the measurements of outputs and outcomes that contribute to the realisation of organisational vision and strategy. These can be classified into two categories:

- Design of systems components to support measurement of measurable facts and context for business processes that start and end within the boundaries of an organisational unit.

- Design of systems components to support measurement of measurable facts and context for business processes that cut across the boundaries of organisational units.
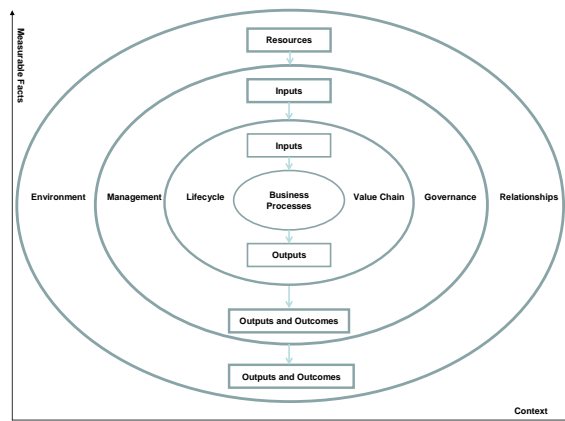

Figure 1: Semantics-Oriented OPM Systems Design Model

4 CONCLUSIONS

The bottom-line of OPM is to allow fast and easy access to up-to-date information that presents stakeholders with a comprehensive view of what is happening in an organisation at any point in time. Though the measurement of business processes and products is not something new, at best, design of OPM systems that seek to support these types of performance metrics, are restricted to the boundaries of organisational units. Thus, only a few implementations of such OPM systems, if any, offer

a way for decision making to obtain performance metrics, which has gone through minimum 'levels of deceit in data and information manipulation'. The focus of semantic-oriented OPM systems design is on measuring the performance of business processes and products that contributes to organisational vision and strategy. The objectives of the semantics-oriented OPM systems design are to support implementation of systems that assist:

- stakeholders internal to an organisation with performance metrics that depicts the overall organisational efficiency and effectiveness.

- stakeholders internal to an organisation with performance metrics that depicts the contribution of each product by outputs and outcomes.

- stakeholders external to an organisation with performance metrics that depicts the overall organisational efficiency and effectiveness.

Regardless of what aspects of an organisation's performance are measured, it all depends upon how productive an organisation has been, is being or is going to be. Productivity is a product of efficiency and effectiveness. Measuring inputs and outputs of processes and activities of an organisation helps to determine its efficiency, whilst, measuring the outcomes of those processes and activities outcomes helps with the evaluation organisational effectiveness. To measure the productivity of an organisation, its products and associated business processes, it is best to measure the efficiency and effectiveness of activities between the signs and their relationships. These can be measured at all the three levels of semiotics, namely syntactic, semantic and pragmatics. However, the measurement of business process efficiency or product quality is more aligned to 'human information functions', which are composed of semantic, pragmatic and the social world. Semantics represent one out of six abstraction levels of semiotics in an organisation. Thus the semantic approach to OPM systems design will need to work with other areas of the 'human information functions' in the organisation, including pragmatics and the social world, and also the 'systems platform', which includes the syntactic of the semiotic framework.

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