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YMARE-576; No. of Pages 15
ARTICLE IN PRESS
Management Accounting Research xxx (2016) xxx–xxx
Contents lists available at ScienceDirect
Management Accounting Research
journal homepage: www.elsevier.com/locate/mar

Evaluating the completeness and effectiveness of management control systems with cybernetic tools

Winnie O'Grady[a,*], Steve Morlidge[b,c], Paul Rouse[a]

[a] University of Auckland, Department of Accounting and Finance, Private Bag 92019, Auckland 1142, New Zealand
[b] Cranfield School of Management, Cranfield, Bedford, United Kingdom
[c] Satori Partners Ltd., Glencairn, Holmesdale Road, South Nutfield, Surrey RH1 4JE, United Kingdom

ARTICLE INFO

Article history:
Received 4 September 2014
Received in revised form 12 February 2016
Accepted 17 February 2016
Available online xxx

Keywords:
Viable systems model
Variety engineering
Law of requisite variety
Management control system

ABSTRACT

In the MCS literature, accounting control frameworks and the concept of the control package offer different views on the components comprising control systems but little guidance for assessing the completeness of the systems or the effectiveness of the control being delivered.

This paper draws on two cybernetic tools, namely the Viable System Model (VSM) and variety engineering (VE) to analyze the completeness and effectiveness of management control systems in a case company.

The components of the system are mapped on to the VSM and the completed model used to assess the completeness of the system. The VSM analysis reveals the MCS of the case company is complete and therefore control problems arising from incomplete structures are not anticipated or found. The VE analysis, guided by the VSM, systematically assesses the company's approach to control by considering how the variety of the control system and the environment are amplified and attenuated, respectively. The analysis reveals the system is designed around processes that amplify branch managers' ability to respond to highly uncertain external conditions. The MCS is judged to provide effective control, meaning it appropriately balances the variety of the system and the environment, enabling branches to consistently achieve their performance goals.

The VSM and VE together provide new tools to describe and analyze MCS and their fit with the external environment.

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1. Introduction

Two key concerns of management control research are to understand how and why management control systems (MCS) are effective in specific settings, and how they can be improved to better achieve organizational goals (Merchant and Otley, 2007). The effectiveness of MCS is influenced by their completeness and their structure, meaning the internal arrangement of the parts comprising the control system (Flamholtz, 1996a). Despite general acknowledgement that MCS are comprised of various sub-systems (Flamholtz, 1996b; Malmi and Brown, 2008; Simons, 2000), there is little agreement about which components are necessary and sufficient to form a 'complete' system. Researchers have acknowledged that ad hoc collections of control techniques are not the same as control systems, and that components articulated, or linked, in certain ways will be more effective than others (Beer, 1981, 1985, 1995; Flamholtz, 1996b). The components of the MCS should function as a collective whole (Kloot, 1997) and work together in a coordinated fashion (Otley, 1999). The effectiveness of MCS, according to contingency theory, depends on the fit between the design of the control system and the context in which it operates (Ditillo, 2004). While accounting control frameworks (Ferreira and Otley, 2009; Flamholtz, 1996a; Simons, 2000) and the notion of the control package (Malmi and Granlund, 2009) provide some insights about MCS they nonetheless offer different views on the components comprising control systems and provide little guidance for assessing their completeness or their effectiveness.

A more prescriptive view for the design of effective control systems is offered in the systems literature. Systems science holds there are generalizable patterns of relationships among elements of systems, applicable across domains, which influence the effective operation of systems. The patterns are arguably relevant to control systems, and can inform our understanding of effective MCS. This

* Corresponding author.
E-mail addresses: w.ogrady@auckland.ac.nz (W. O'Grady), steve.morlidge@satoripartners.co.uk (S. Morlidge).

http://dx.doi.org/10.1016/j.mar.2016.02.003
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research draws on two strands of cybernetic thought from the systems literature, namely the Viable System Model (VSM) and variety engineering (VE) to provide insights about the structure and the effectiveness of MCS.

The VSM is claimed to specify the necessary and sufficient structural arrangements, meaning the functions and communication channels, to support the viability of any system, (Beer, 1981, 1985, 1995; Pérez Ríos, 2012; Schwaninger and Rios, 2008). Viable organizations are able to preserve their independent existence by maintaining the values of key variables within proscribed limits over time. The essential variables may include, for example, net profit, cash flow, and market share. According to Beckford (1993), the VSM is useful for diagnosing faults in organizational structures by comparing the reality of the organization with the expectations of the model and identifying any weaknesses that could impede the effectiveness of control processes.

The conditions for effective control are stated in Ashby's (1958) Law of Requisite Variety (LORV). In simple terms, the LORV states that the variety of a regulator must at least match the variety of the environmental[1] conditions impacting the performance of the system (Rosenkranz and Holten, 2010). The VSM specifies a structure that enables organizations to conform to the law of requisite variety (Beer, 1985, 1995). Variety engineering (VE) is the process through which organizations attempt to balance the variety of the regulator and the environment to achieve control. VE is enacted via the communications between components of the system and the collective impact of these exchanges influences organizational viability. According to Mintzberg (1979), the VSM with its network of decision elements and communications channels suitably reflects the information flows in organizations; thus it enables a systematic VE assessment of control processes in organizations. The VE analysis provides evidence to support judgements about the effectiveness of the organization's approach to control. 'Effective control' implies the organization is likely to consistently maintain the values of its essential variables within physiological limits (Amey, 1979, p. 253),[2] or more simply, keeping values of key variables within proscribed limits, both now and in the future.

This research considers how cybernetic tools, systematically applied to evaluate MCS, support new insights about the completeness of the control system and its effectiveness. The VSM and VE are used to diagnose and evaluate the MCS in a case organization. More specifically, the tools are used to analyse the system for controlling branch level performance, comprised of the control, coordination and monitoring functions[3] and their interactions.

The completeness of control systems is important for the effective operation of control processes. Incomplete control system structures impact how control processes operate, and weaknesses will reduce the effectiveness of control. Effective control depends on managing the variety faced by an organization. Failure to manage variety leads to inconsistent goal achievement.

This research contributes to the management control literature as follows. First, we show how the VSM assesses the completeness of the MCS in our case company. The MCS is judged to be complete at the branch level, with respect to the VSM functions and communication channels. We did not assess completeness using accounting-based frameworks because the literature indicates they are of limited usefulness for this task. Second, we show how evidence gathered from a VE analysis enables an evaluation of the effectiveness of control. In our case company the MCS provides effective control. That is, the control system has a response repertoire that can match its environmental variety in a way that supports consistent goal achievement. Third, we believe the analysis of communications in terms of how they attenuate and amplify variety provides a new paradigm for better understanding how control processes operate. In short, the contribution of this paper is to show how the VSM provides a lens to analyze the structure of MCS complemented by VE for evaluating how effectively the interactions between structural components manage variety.

The VSM analysis in our case company revealed the MCS for operational control of branches is complete and therefore any observed control issues are not due to an inadequate structure. The VE analysis provided evidence to conclude that the control system is effective. That is, the approach followed by branches to balance variety suggests they will consistently achieve performance targets even in the face of unanticipated operating conditions. The tools of VSM and VE analysis extend existing understanding of MCS in the following ways. The VSM analysis focuses attention on the internal arrangements between components of the system and provides explanations for observed control issues; inadequate structural arrangements give rise to known symptoms or problems. The VE analysis provides a new approach for judging the effectiveness of control systems.

The paper is structured as follows. Section 2 first considers the literature on the structure of control systems (meaning their components and interactions) and effective control, then introduces the Viable System Model (VSM) and variety engineering (VE). Section 3 describes the research approach. Section 4 introduces the key components of the system for controlling branch level performance in our case company. The case is used to illustrate how the VSM and VE tools can be applied to analyse the structure and effectiveness of an MCS. Section 5 presents the VSM and VE analyses of the MCS. Section 6 discusses how the findings from the cybernetic analysis extend our understanding of MCS. Section 7 provides concluding comments.

2. Literature review

The MCS and systems literature provide alternate views on control system structure and effective control. These two issues are addressed in turn in the following sub-sections.

2.1. *Control system structure*

The management control literature presents various frameworks and descriptions addressing the composition of control systems. One framework for describing and visualizing organizations' overall control systems is provided by Flamholtz (1996a). His model is comprised of a core control system, organizational structure and organizational culture. The core control system "is a cybernetic structure consisting of four subsystems (planning, operations, measurement, and evaluation-reward) which are articulated (linked) by feedback and feed-forward loops." (Flamholtz, 1996b, p. 17). Furthermore, the core control system can be designed to address various levels of organization, including individual, department, division or enterprise levels. Whatever the level, all elements of the core system should be in place and operate together as an integrated whole; missing elements will reduce the level of control that can be achieved.

Other holistic MCS frameworks specify different numbers and types of components, including, for example, four levers of control (Simons, 1994), twelve issues and four contextual factors (Ferreira and Otley, 2009), and five planning, cybernetic, reward, administrative and cultural controls (Malmi and Brown, 2008). While the

[1] This encompasses both internal and external environments.

[2] Amey refers to Ashby's (1958) descriptions of essential variables as 'the dominant subset of system variables' and physiological limits as the range within which the values of essential variables must be kept to ensure viability.

[3] These are the VSM functions associated with regulating performance of operational units, and are described more fully in the next section.

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