Working Toward a System for Measuring Dynamic Knowledge

Mark E. Nissen, Information Science and Management Department, US Naval Postgraduate School, Monterey, CA, USA

ABSTRACT

Knowledge is inherently intangible, invisible and resistant to quantification, particularly when in dynamic motion. This makes it a considerable and persistent challenge to understand, visualize and measure. The research described in this article builds upon emerging knowledge measurement techniques and well-established knowledge flow theory to develop a system for measuring dynamic knowledge in the organization. This measurement capability is developed judiciously and analogically from the author’s understanding of dynamic physical systems. As a background, the key literature on knowledge measurement and knowledge flow theory is reviewed. Then this system for measuring dynamic knowledge is conceptualized, and its use, utility and theoretical coherence are illustrated through practical application. This research makes a theoretical contribution by advancing a coherent approach to dynamic knowledge measurement, and it makes a practical contribution through illustration in the organization context. A related goal is to stimulate considerable thinking, discussion, debate and continued research.

KEYWORDS
Dynamic, Knowledge, Knowledge Flow, Knowledge Flow Theory, Measurement, Physics

INTRODUCTION

Knowledge is key to competitive advantage (Cole, 1998; Grant, 1996; Spender, 1996): Knowledge enables effective action; effective action drives superior performance; and superior performance supports competitive advantage (Nissen, 2014). Indeed, some scholars argue that knowledge represents the only sustainable source of competitive advantage (Drucker, 1995).

However, knowledge does not represent a single, monolithic concept: Different kinds of knowledge (e.g., tacit, explicit, individual, group, created, applied) have qualitatively different properties and behaviors, and hence affect action, performance and competitive advantage differently (Nissen, 2006a). Neither can knowledge remain static in support of competitive advantage: It must move or flow rapidly and reliably from where and when it is to where and when it is needed in the organization.

This places particular importance on understanding the dynamics of knowledge as it flows, but unfortunately, knowledge is inherently intangible, invisible and resistant to quantification (Ahn & Chang, 2004), particularly when in dynamic motion. This makes it a considerable and persistent challenge to understand, visualize and measure.

The research described in this article builds upon emerging knowledge measurement techniques and well-established knowledge flow theory to develop a system for measuring dynamic knowledge in the organization. This measurement capability is developed judiciously and analogically from our understanding of dynamic physical systems. As background, the key literature on knowledge measurement and knowledge flow theory is reviewed. Then this system for measuring dynamic

DOI: 10.4018/IJKM.2017070101

Copyright © 2017, IGI Global. Copying or distributing in print or electronic forms without written permission of IGI Global is prohibited.
knowledge is conceptualized, and its use, utility and theoretical coherence are illustrated through practical application. This research makes a theoretical contribution by advancing a coherent approach to dynamic knowledge measurement, and it makes a practical contribution through illustration in the organization context. A related goal is to stimulate considerable thinking, discussion, debate and continued research.

BACKGROUND

In searching for relevant literatures to review, a relatively wide metaphoric net is cast, looking for background, insight and inspiration well beyond the knowledge management field. Indeed, much of the research to measure knowledge has been conducted by economists (e.g., Hayek, 1937; Machlup, 1962; Glazer, 1998; Edvinsson, 2002), who have understood the power and prominence of knowledge as an economic resource for a long time. Shifting to Strategy, the techniques that center on the Balanced Scorecard (e.g., Bose & Thomas, 2007; Wake, 2015) are found, along with those enabling the knowledge based firm that competes on knowledge (Kogut & Zander, 1992; 1993).

Shifting again, a number of researchers look to the education context for measurement techniques, including academic tacit knowledge (Insch, McIntyre & Dawley, 2008), student knowledge retention (Bacon & Stewart, 2006), self-confidence in one’s answers (Hunt, 2003), and outcomes of student learning, among other measures of the global knowledge economy (Marginson, 2009).

Additionally, numerous works are found that use patent citation as a proxy for knowledge flow (Ye, Zhang, Liu & Su, 2015; Chavez & Viquez, 2015; Duguet & MacGarvie, 2005), even though such method is notably circumspect (Roach & Cohen, 2013), and a number of researchers offer the familiar learning curve as a measurement tool (Eppler, Argote, & Devadas, 1991; Ingram & Simons, 2002), augmented by the employment of vectors in knowledge flow analysis (Sultanow, Cox, Brockmann & Gronau, 2014).

Other researchers seek to link the contribution of knowledge to organization work (McIver & Wang, 2016) and performance (Ahn & Chang, 2004; Mills & Smith, 2011), value added (Zeleny, 2013) and outcomes (Soo, Devinney, Midgley, & Deering, 2002), project team performance (Yoo, Vonderembse, & Ragu-Nathan, 2011), and the progress of knowledge in marketing research (Eisend, 2015). Still others work to understand and measure an organization’s readiness to undertake knowledge management (Holt, Bartczak, Clark & Trent, 2007), in addition to its knowledge management capabilities (Kulkarni & Freeze, 2004; 2006).

Another related research stream is driven by progress on measures of knowledge management success (Jennex & Offman, 2004; 2006; Jennex, Smolnik, & Croasdell, 2007; 2008), and Darroch (2003) develops a scale to measure knowledge management behaviors and practices. Many of these and like research streams along such lines began as rough conceptualizations and studies that worked toward the development of frameworks and models, just as this present study does.

Given the interrelations between knowledge and information, the authors look further to Information Theory for insight as well. Research in this area began with a concentration on signal transmission through a noisy channel (Shannon, 1948), which introduced measurement concepts such as information entropy, channel capacity and others that pertain more to telecommunications signals than knowledge flows. Nonetheless, a substantial body of work has been conducted along these lines, with whole courses and textbooks on the subject (Ash, 1965), which can inform our study to the extent that dynamic knowledge can be conceptualized in terms of signals and channels.

More specific to the focus of the present project, a number of researchers have endeavored to address the measurement of dynamic knowledge as it flows (Preiss, 1999). Szulanski (2000), for instance, conceptualizes a model of knowledge transfer in the organization that depends upon the “stickiness” of knowledge as it flows. Swart and Powell (2012), as another instance, conceptualize dynamic knowledge through a system of mathematic equations to support empiric measurement. Quite recently, as a third instance, Corallo and colleagues (Corallo, Lazoi, Secundo & DePaolis, 2016)
A Context of Challenges
Ulla de Stricker (2014). Knowledge Management Practice in Organizations: The View from Inside (pp. 1-32).
www.igi-global.com/chapter/a-context-of-challenges/98526?camid=4v1a