

Knowledge Management Guided by Economic Valuation Models

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Abstract—In this paper we examine Space Mission Knowledge Management (KM), where enterprise knowledge is created by knowledge workers within a community of practice. We consider the increasing impact of Social Software (SSW) on a modern KM practice and regard the difficulty in harmonizing the SSW benefits with distractions that are characteristic of Web 2.0 technologies. The notion of knowledge tightness is studied, and knowledge markets are compared with early-stage and mature capital markets. The notion of efficient markets and vetting published work is compared. It is argued that knowledge should be prescriptive, collective, and tight in order to accommodate effective KM.

Index Terms— Space Missions, Social Software (SSW), Knowledge Management (KM), Enterprise Performance, Knowledge Economics, Knowledge Worker (KWR), Knowledge Currency, Knowledge Aggregation, Prescriptive Knowledge, Knowledge Tightness, Community of Practice (CoP)

I. INTRODUCTION

THIS paper is focusing on providing a measure of economic value for KM activities, and in particular the value of social software integration with KM architecture. Our work in [StuBet2008] describes several years of experience in spearheading KM within The Aerospace Corporation, the steward of national security space (NSS). We always consider the investment needed in order to successfully establish effective KM, versus the value provided by achieving effective KM. The observation is made that despite a multitude of SSW tools and technologies, it is not always clear how the value of KM is enhanced. In order to further our understanding of KM value, we create an analogy from capital flows to knowledge flows, and derive some observations about the quality of the knowledge, and the efficiency associated with vetting positions and efficient capital markets.

- What are some definitions that can form a basis for comparison between knowledge flow and currency flow?
- How can we judge the quality of knowledge using a historically economic frame of reference?
- Compare knowledge flow to currency flow in capital markets - are there things to be learned when we propose “knowledge = currency”?
 - *What are the “value metrics” that can be used to compare knowledge and currency?*
 - *Are there valid comparisons to be made between a capital (industrial) market and a knowledge (information) market?*
- **Useful knowledge** - term by economist Simon Kuznets [Kuznets1965]*

- *From economic historian Joel Mokyr [Mokyr2001] a theory of useful knowledge**
 - **What** - or *propositional knowledge* - knowledge about natural phenomena and regularities
 - **How** - or *prescriptive knowledge* – techniques or tribal knowledge within the organization
 - **Engineering knowledge** - quantitative relations between measurable properties and variables and abstract structures
 - Knowledge can be in dispute and speculative, or it can be widely accepted or *tight* * - **Tightness** is a measure of *consensualness* of a piece of knowledge
 - **Knowledge Tightness** - a function of the ease of verifiability - the confidence that people have in the knowledge - the willingness of people to act on that knowledge
 - **Confidence** - the more likely people are apt to use or apply
 - **Consensus** - the broader the agreement
 - **Who knows what?** - What each individual knows is less important than what society as a whole knows and “can do.”
 - *There are very few quantum physicists, but the fruits of their knowledge are widely available to those with interest and need - just as if everyone has been taught advanced physics and quantum mechanics.*
 - What really counts is **collective knowledge** of society (and organization)
 - **Aggregation** - how do we go from individual knowledge to collective knowledge with the greatest efficiency and lowest cost access
 - **Probability of Knowledge Transfer** - depends on the social organization of knowledge, storage technology, and who controls access

When we compare capital markets to the marketplace for prescriptive knowledge, there is an obvious similarity:

- **Capital Economics** - Free movement of capital and goods with sufficient land, energy, and labor for production and delivery of products
- **Knowledge Economics** - Free movement of knowledge and talent with the application of prescriptive knowledge in the proper context

Equality is another topic that can be used to compare capital markets with knowledge markets. To make this comparison we must consider each market in its early

stage as well as in a mature stage of operations. The specific point of comparison is rooted in the concept of economic or knowledge inequality.

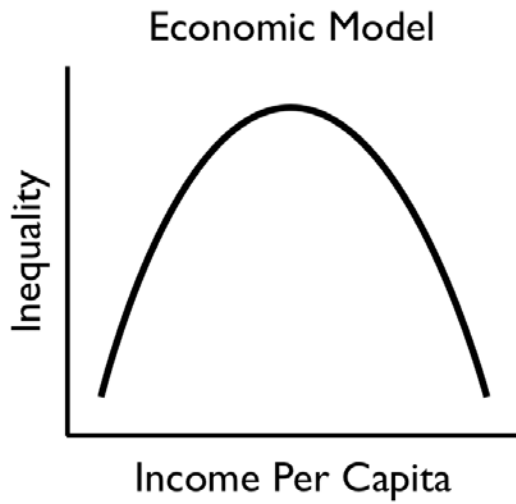


FIGURE-1: Economic Inequality of Income Per Capita

This point of comparison has been formulated by expanding on the work of Simon Kuznets and specifically the Kuznets curve. Kuznets curve is a representation of Simon Kuznets's theory that economic inequality increases over time while a country is developing, then after a critical average income is attained, begins to decrease. This offers an interesting comparison with knowledge development and sharing within an organization. We consider the following aspects of knowledge management at both early stage and maturity.

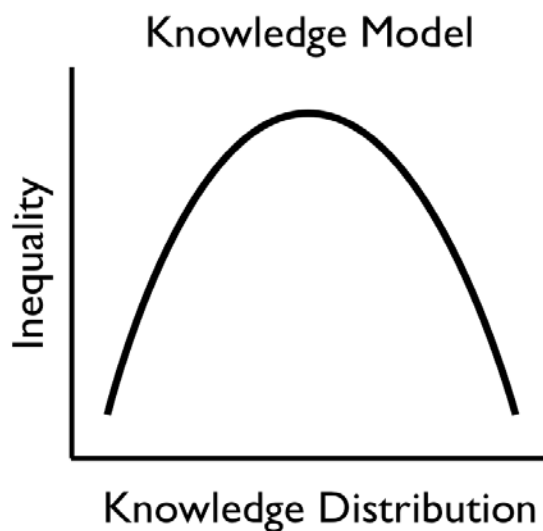


FIGURE-2: Knowledge Distribution Inequality

Early Stage Knowledge vs Currency

Currency - During early stages of development, when investment in physical capital is the main mechanism of economic growth, inequality encourages growth by allocating resources towards those who create additional value, save, and invest the most.

Knowledge Comparison - Within an organization that is new, a large percentage of resources is directed at the formulation of differentiable prescriptive knowledge - the organizational techniques that will provide differentiable value to customers.

Consider the following techniques to combat inequality in the distribution and exchange of knowledge during early stage operations:

- Establish recording process for dissenting opinions
- Allow parallel authorship of material that has not been fully developed
- Build peer-assists, after action reviews, and just-in-time learning into the product delivery process

Mature Stage Knowledge vs Currency

Currency - In mature economies human capital accrual (an estimate of cost that has been incurred but not yet paid) replaces physical capital accrual as the main source of growth. Inequality slows growth by lowering education standards because poor people lack finance for their education in imperfect credit markets.

Knowledge Comparison - In organizations with mature prescriptive knowledge (techniques about how to apply propositional knowledge) efficiency of the workforce that has prescriptive knowledge is high, while transfer of this knowledge to those lacking is in conflict with the production efficiency of the prescriptive knowledge experts as they complete their work tasks.

The following techniques are proposed to combat inequality in the distribution and exchange of knowledge during mature stage operations:

- Enable syndication allowing mashups of established prescriptive material
- Assure that authoritative knowledge sources are well documented and available to all members of staff
- Make reciprocal mentorship between legacy staff and new hires a standard

The flow of knowledge and its processing and vetting within the enterprise facilitated by Web 2.0 social software technology is illustrated in the figure below. In this figure we notice that a select collection of technology is "wired into" the prescriptive process of collaborative forming, vetting, and delivery of knowledge.

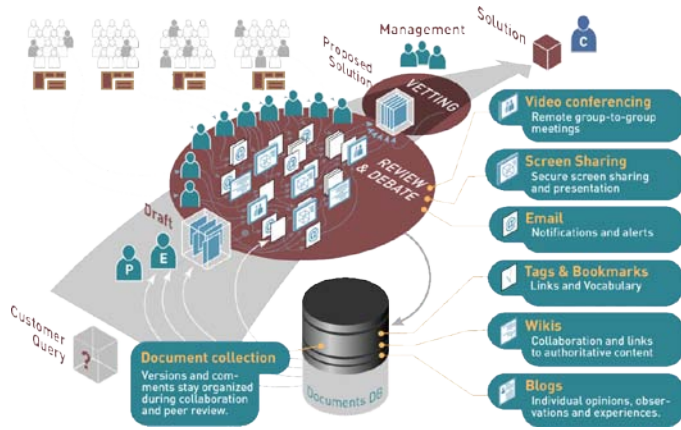


FIGURE-3: Knowledge Forming to Solution

We also note that participants in this activity conform to a very deliberate process in creating a community position for a specific topic. That process framework is shown in Figure-4.



FIGURE-4: Community Position Process

We find that social software can be effective in achieving both high consensus as well as tighter agreement on the knowledge. While without a prescriptive process to guide Web 2.0 technology usage, this same technology that can provide a powerful adjunct to knowledge creation can devolve into a taskmaster of endless distraction. The “distracted worker” that is a slave to email, instant messages, work status updates, and tending their “blog and wiki garden” is not the goal. Technology adaptation must follow a prescriptive process that is in tune with the organizational culture. Only then does the propositional knowledge combine with experience to create lasting value.

The paper will further explore additional analogies between the industrial economy and the information and knowledge economies. We compare the value of infrastructure and services, as well the “soft” aspects of the human interface and the organizational behavior. Output can be collective knowledge, versus production for an economy or organization.

We argue that efficient knowledge markets allow for effective availability of knowledge when and where it is needed. The tools that facilitate that collectively are more effective when such flows are achieved with less organizational and individual effort.

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