

## GLOBAL MANAGEMENT OF KNOWLEDGE SYSTEMS

**David Rooney**

*University of Queensland, Brisbane, Australia*

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### Summary

What is presented here is a multidimensional view of how a nation might manage its knowledge resources to take an advantageous position in the global knowledge economy. In order to work within the above operational structure, policy-makers need to be aware of the differences between knowledge and information; and the differences between the economic dynamics of knowledge and those of goods in the tangible economy. In particular, we need to be aware of how those differences suggest that more open, collaborative, and trustworthy types of behavior are needed to exploit knowledge. What also needs recognition is that the diffusion of knowledge is the communication of meaning, and that because of the links between meaning, knowledge, and context, that knowledge is problematic, and, indeed, enigmatic. These conditions make knowledge risky and necessitates that some level of risk management be associated with knowledge policies. The operational framework for knowledge management presented here provides a template for focusing these behavioral characteristics across a nation's external, internal, and individual knowledge structures. We can view these structures and behaviors as the intellectual infrastructure of a nation.

What is clear in this discussion is that policy undertakings such as those presented here are extremely difficult ones. They are undertakings surrounded by complexity, ambiguity, uncertainty, and risk. However, despite these challenges the benefits to nations wanting to play a role in the global knowledge economy through the development of their intellectual infrastructure will be substantial.

### 1. Introduction

Globalization has meant that knowledge and information can be diffused across the world at increasing rates. However, what are the relevant economic and social facets of

this diffusion that need to be understood if we are to manage knowledge at a global level? In this entry, a strategic and operational framework for use in the management of global knowledge systems is set out. The aim of this framework is not to provide a guide to the management of the global knowledge economy, but rather a guide for national policy-makers who wish to manage their nation's position and performance as a participator in the global knowledge economy. It is a framework with which government can work to develop the necessary intellectual infrastructure for the global economy.

To facilitate an enhanced understanding of how knowledge can be managed at a global level it is necessary (1) to examine the differences between knowledge and information so that the two related but different (and often confused) entities are understood correctly; (2) to set out some of the most relevant economic dynamics of knowledge so that we can begin to map out appropriate new behaviors that are conducive to the fostering of knowledge creation, use, and diffusion (behaviors that are often different from the kinds of behaviors exhibited when one assumes that the economic dynamics of tangible goods still prevail); (3) to enter into a discussion of some of the critical factors in the effective communication of knowledge; and (4) to set out a formal operational framework for managing knowledge at the global level (see *From the Information Era to the Communicative Era: Social and Spiritual Issues and Futures*).

## **2. Knowledge and Information**

It is necessary to discuss the characteristics of knowledge and information so that our subject is better understood. The principal focus in this entry is knowledge rather than information. It is clear that the two terms are often used interchangeably when, in fact, they are different. Information is data organized in the form of text, statistics, patents, and so on. These things can be represented in, for example, books or transmitted through the Internet. The level at which data is transformed into information is somewhere short of knowledge.

Knowledge goes beyond organized data, it is the result of the processing or sense-making of information by the mind. Furthermore, knowledge cannot simply be transmitted like data between computers, it is diffused by people reconstructing (or reinterpreting) it through complex social and cognitive processes. Knowledge is situated in relation to a greater interpretive context than information and is, in a sense, the fuel that allows people to do things. Therefore, although we may need to act differently upon receipt of new information, it is the knowledge we have that allows us to determine what the information means and that we have to act in that way. Thus, we can divide knowledge into know-how (to do things), know-what (to do), know-why (to do it), and it can even be seen as know-who (or where to go to for the necessary knowledge to enable action). Knowledge, therefore, is intellectual abstraction and is not necessarily easily or adequately captured in books or other media. It is quite certain that not all the knowledge that resides within a person is easily articulated (or even rationalized), and that it is not always easy to say how we learned it. We may even be unaware of all the knowledge we possess. Knowledge also consists of beliefs and values, based on the meaningfully organized accumulation of information through experience, communication, or inference. Beliefs and values are not hard truths but are soft, open to

interpretation and contingent upon the context within which they exist. Knowledge is, therefore, a rather slippery subject. It is intangible and ambiguous yet pervasive and, of course, of great importance. These enigmatic qualities distinguish knowledge from information, even if the distinction is at times a somewhat fuzzy one.

We can further clarify our focus by dividing knowledge into codified (explicit) and tacit (uncodified) knowledge. Codified knowledge is that knowledge which can be relatively easily well expressed in the spoken word, text, computer programs, blueprints etc. That is, it can easily be captured and interpreted in symbolic codes. Its meaning is relatively unproblematic. Codified knowledge is rather like information (indeed, it could be said that it has no clear boundary between itself and information), but goes beyond information because it is more than, for example, information on a page that is awaiting interpretation in relation to specific uses or settings. In other words, the meaning of codified knowledge is relatively explicit, it has easily defined, shared meanings and uses within particular social groups (professions, demographics, cultures, etc.). Thus codified knowledge is social, cognitive, and personal.

Tacit knowledge, on the other hand, is that which is not easily captured in codes. Tacit knowledge includes the enigmatic values, beliefs, practical skills and “tricks of the trade” that we possess. These are hard things to pin down but are of paramount importance if we are to get most jobs done in a timely and effective manner. In this case learning-by-doing and nonverbal communication, for example, are necessary in diffusion. This, of course, makes the accurate diffusion of tacit knowledge problematic and prone to misinterpretation. However, just as the distinction between information and codified knowledge is fuzzy, so the distinction between tacit knowledge and codified knowledge is somewhat artificial. In reality, most knowledge is a mixture of tacit and codified “elements.” Moreover, we need both tacit and codified knowledge to work in complementary ways if we are to utilize fully our knowledge resources. To try to work with only tacit knowledge or only codified knowledge is to be considered a disadvantage.

### **2.3. Economic Dynamics of Knowledge**

To manage a knowledge economy effectively we need to understand the economic dynamics of knowledge because they are different to the economic dynamics of physical goods. Knowledge is a human artifact and, therefore, the economic dynamics of knowledge are closely aligned to human behavior, and because of this close link it is sensible to explore what it suggests is appropriate human economic behavior when knowledge is of paramount importance. Moreover, in making a distinction between tangible (physical goods) and intangible (knowledge) economics we can make different and more realistic assumptions about how to manage knowledge economies.

Orthodox economic thinking makes the assumption that the change of possession (or ownership) of goods means that the inventory of the vendor is decreased. With knowledge, though, this does not apply—the vendor’s inventory of knowledge is not decreased when their knowledge is exchanged. This situation underlines the importance of facilitating exchanges of knowledge and of considering how potentially unhelpful blockages of access to knowledge (such as knowledge monopolies and oligopolies

through, for example, patents) could be. We can also ask how markets function when the traded artifact has such ambiguous ownership. Indeed, do we need to think of new, nonmarket diffusion/distribution mechanisms?

If we are not depleting our own inventories of knowledge, we may be in a position to adopt other views about its diffusion. For example, if its value in exchange is not necessarily increased by its relative scarcity but by its perceived value, we may need to focus on building trust between parties, to improve reputation, to build relationships, and develop other forms of social capital. This social capital formation is also necessary to create value because the perceived value of knowledge is likely to be a reflection of how much we trust the source rather than any intrinsic quality of truth or validity in the knowledge. It is possible, therefore, to see the value of knowledge increased by the confidence in it produced by its abundance rather than its scarcity.

Extending this analysis, another important characteristic of knowledge is that it tends to grow through sharing. In other words, knowledge is expandable—it can grow and evolve through its diffusion. As people exchange knowledge in conversation they increase their knowledge and in all likelihood create new knowledge. This is particularly so in the case where knowledge is shared between people with complementary knowledge working in related areas with common problems. Indeed, we frequently see businesses that strategically share their own intellectual property with competitors for their mutual benefit. Furthermore, as knowledge grows its social value is enhanced and this process of growth, evolution, and enhancement can continue, in theory, indefinitely. Therefore, it is advantageous, if one wants to increase one's knowledge, to be in an environment in which it is accessible through direct and indirect contact with other people.

Not only is the sharing of knowledge advantageous, but also the cost of producing knowledge tends to be independent of the scale on which it is used. In other words, it is not necessarily any more expensive to use your knowledge on a large project than it is on a small project. One such example is the case of Microsoft Windows, which embodies vast amounts of technical and market knowledge. It cost Microsoft US\$50 million to get the first copy made but the second (and subsequent) copies only cost US\$3 each to produce.

The characteristic returns to scale that Microsoft has achieved also illustrate the growing importance of networking in a knowledge economy. For Microsoft it was also their vast networks of already locked in “loyal” customers, retailers, and developers that assisted them in making huge returns on their embodied knowledge.

However, whilst Microsoft may be a good example of increasing returns to scale they cannot be said to have been particularly open and sharing. Indeed, many of their relationships appear to have been based on force, coercion, and fear, and it seems reasonable to assume they do not have the levels of social capital that they will need for their medium- and long-term future. However, a strong growth of cooperative arrangements (such as joint ventures and strategic alliances) and institutionalized information exchange in a widening range of business settings is easily observed today,

and this suggests that traditional adversarial and coercive relationships are already under review anyway.

We can better understand knowledge diffusion by thinking of ecologies rather than marketplaces (see *Transformations of Information Society*). The ecological metaphor is one that implies organic change that can be sought through the establishment of networks of mutually adjusting and mutually beneficial relationships between the nodes (firms, individuals) of the network. In light of the growing shift to network formations, developing social capital and communication expertise in relationships is paramount if knowledge is to be effectively managed.

These relationships may be competitive or cooperative in nature, but the essential component of relationship building is communicative activity that fosters rich conversations (see *From the Information Era to the Communicative Era: Social and Spiritual Issues and Futures*).

The traditional models of economics also assume predictable economic change and betray a fetish for certainty. However, uncertainty is an important characteristic of knowledge creation and of knowledge itself. The risk in knowledge creation comes about because knowledge production and diffusion is a human activity and as such is constrained by the cognitive and rational limitations that are bound to humanity. Risk also comes from such things as the fact that the meaning of any knowledge artifact has to be interpreted and, depending on the context in which the interpreter is situated, different interpretations will arise.

Different meanings imply that the same knowledge will be seen to have different uses, some of which were unforeseen by the creators of that knowledge. Knowledge, therefore, is not fixed, stable or predictable, it is problematic, indeed, even enigmatic. Although it is not directly a public policy issue (but rather one at the level of the firm), it is well to point out that risk is also found in the knowledge worker. Employers often ponder such issues as how do you know that the knowledge workers know what they say they know? How good are they at deploying their knowledge? Will we be able to capitalize on the new knowledge they bring with them? When they leave how much knowledge will they take with them to competitors?

Knowledge work, given its problematic and enigmatic qualities, must, therefore, also include some kind of knowledge risk management strategy (see *Navigating Globalization through Info-design, and Alternative Approach to Understanding Cyberculture*). This entails an effort to anticipate and cope with the adverse outcomes of risk-taking. In addition, there is also the need for the provision of support for those who have taken knowledge creation and use risks and failed so that risk-taking does not become too onerous.

However, what is possibly more at issue is the monitoring of inappropriate high-risk activity and inappropriate risk aversion, and the achievement of a good spread of risks so that the diversity of activity is maintained. These kinds of issues can be influenced greatly at a public policy level, thereby enhancing a nation's ability to compete internationally.

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### **Biographical Sketch**

**David Rooney** is a senior lecturer in Communication Management at the School of Management, University of Queensland, Brisbane, Australia. His main research interests are in knowledge studies and technology studies, with a particular interest in knowledge-related public policy.